

AXIOMATIZING THE EDUCATION SYSTEM: ANALYSIS, TAXONOMY OR PROFESSIONAL DEVELOPMENT?

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Abstract. The author starts by attempting to **Axiomatize** the Education System and by clearly outlining what is meant by **Axioms** and the **Axiomatic Method**. Essentially, he takes an **Axiomatic Approach** to defining **Axiomatization**. He then describes how a facilitated workshop was used to agree the key features of the education system:

- a list of short statements (say 100) about education;
- cognate groups (say 10) that are used to sort the statements; and
- longer statements that describe those groups.

The longer statements are initially given the status **First Order Axioms**, while short statements are given the status of **Second Order Axioms**. The **First Order Axioms** were then grouped into:

- **Fundamental Axioms**;
- **Structural Axioms**; and
- **Functional Axioms**.

The main body of the paper then clearly articulates:

- those **First Order Axioms: Pupils; Education; The State; Subsidiarity; The School; Leadership and Management; The Curriculum; Teachers and Teaching; Assessment and Accreditation and Monitoring and Evaluation**; along with
- the accompanying **Second Order Axioms** that were generated when the author participated in their own facilitated workshop.

The author also provides the diagrammatic overview of the education system that resulted from the facilitated workshop.

He concludes that although the approach can be useful, it has its limitations: a number of the key requirements of **Axiomatic Systems** cannot be met. The education system is so complex that the **Axiomatic System** derived from an **Axiomatic Approach** cannot be **Consistent** and **Independent**; nor can all the statements be shown to follow **logically** from statements that are, in turn, the **logical** result of other statements.

The author finally concludes that, although the approach is useful, the terms **Axiomatic System** and **First and Second Order Axioms** should be replaced by

Taxonomy and First and Second Order Statements.

However, he does suggest that developing a **Taxonomy of Educational Objectives** could be very useful for:

- providing an agreed high-level description of the education system; and
- in-service education and staff development purposes.

Keywords: axioms; axiomatic approach; pupils; system; taxonomy; educational objectives

Introduction

In an investigation of the strengths and limitations of axiomatizing the education system, this paper considers:

Axioms and the Axiomatic Method.

The Process of Axiomatization.

The Product – First Order Axioms.

First and Second Order Axioms of the Education System.

- Fundamental Axioms.
- Structural Axioms.
- Functional Axioms.
- With Diagrammatic Overview.

And finally:

A **Conclusion** that the process of **Axiomatization** has so many limitations that terms **Axiomatic System** and **Axioms** should be replaced by **Taxonomy** and **Statements**.

Axiomatizing the Axiomatic method

An **Axiomatic Approach** to defining **Axiomatization**.

A1. An **axiom** comes from the Greek *axiōma* (ἀξίωμα) 'that which is thought worthy or fit' or 'that which commends itself as evident'.

A2. An **axiom** is a statement that is so evident or well-established, that it is accepted without controversy or question.

A3. An **axiom** is a premise or starting point for reasoning: a statement that serves as a starting point from which other statements are logically derived.

A4. **Axiomatization** is the process of taking a body of knowledge and working backwards towards its axioms.

A5. **Axiomatization** is the formulation of a system of statements (i.e., **axioms**) in order that a **consistent** body of propositions can be derived deductively from these statements.

A6. An **axiomatic system** is said to be **consistent** if it lacks contradiction; i.e., it is impossible to derive both a statement and its negation from the system's **axioms**.

A7. An **axiomatic system** is called **complete** if every statement, or its negation, is derivable from the system's axioms (that is to say, every statement is capable of being proved to be true or false).

A8. In the education system, the **axiomatic method** is a way of proving the truth of statements.

A9. To **axiomatize** the education system is to demonstrate that its claims are derived from a well-understood set of sentences, basic concepts/terms and the rules of logic – **First Order Axioms**.

A10. In order to apply to the education system, **First Order Axioms** are substantive assertions about aspects of the system.

A11. For a statement in the education system to be true, it follows **logically** from a number of statements that are in turn the **logical** result of other statements.

A12. **Consistency** is a key requirement in the education system, as the presence of contradiction would allow any statement to be proven.

A13. In the education system, axioms are **independent** if they are not proved or disproved by other axioms in the system.

A14. In a proof in the education system there are certain statements called **First Order Axioms** that are taken to be true without justification.

A15. Because it minimizes the number of **First Order Axioms**, **independence** is important in the education system.

A16. Each **First Order Axiom** is followed by the list of subordinate axioms - **Second Order Axioms**. Because the education system is so large and complex, the number of **Second Order Axioms** is (seemingly) endless. Furthermore, **Second Order Axioms** are not always **independent** and are clearly related to the lower order axioms of other **First Order Axioms**.

Axiomatization: The Process

Axiom A4 states very clearly that **Axiomatization** is the **process** of taking a body of knowledge and working backwards towards its axioms. So, the first task the author set himself was to agree that body of knowledge; i.e., the key features of the education system. This was achieved in a facilitated workshop¹; this workshop was described more fully by Budgell and Kunchev (2019).

About one hundred short statements (key features) about the education system were generated – with nothing being prescribed nor proscribed. Examples of “short statements” about Teachers and Teaching, for example, are illustrated in Table 1.

Then, without initially specifying the number of groups, these short statements were organised into cognate groups and each group was given a short ‘working title’. This process was iterative; the groups having to be deconstructed and reconstructed until an agreed pattern was achieved. When the cognate groups and their titles were agreed, the ‘working titles’ were re-written to form coherent statements about the education system; for example:

‘**FO8.** The **Teacher’s** role must develop as pupils mature; changing from the dispenser of core knowledge to the facilitator of self-directed learning.’

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Although they could be described as ‘common sense’ or obvious ideas about the education system, the coherent statements were initially seen to constitute **First Order Axioms**. The original short statements generated in the facilitated workshop were then re-written to form attached lists of subordinate **Second Order Axioms**.

In the following discussion about the education system:

- the **First and Second Order Axioms** were those generated by the authors in their own facilitated workshop (Budgell and Kunchev 2019);

and

- the **First Order Axioms** are **stated explicitly** rather than being generally implied.

It is assumed that readers have some **knowledge** about the education system and the ability to draw upon that knowledge to understand how the **First Order Axioms: pupils, education, the state, subsidiarity, schools, leadership and management, the curriculum, teachers and teaching, assessment and accreditation and monitoring and evaluation** are used.

Similarly, there are many **Second Order Axioms**, but these terms are also commonly used in the education system. Furthermore, as the **First Order Axioms** are articulated and defended, the reader is asked to look around and observe the routine functioning of the school system (any school system in ‘the real world’).

Axiomatization: The Product – First Order Axioms

FO1. Pupils develop their knowledge, skills and understanding through a process of education and become socially adjusted individuals.

FO2. Education enables pupils to maximize their potential and become well-adjusted members of society.

FO3. It is The State’s responsibility to effectively and efficiently allocate and delegate sufficient resources to enable schools to meet the personal, social and intellectual needs of the pupils.

FO4. The School creates the environment, opportunity and conditions that enable pupils, teachers and parents to interact and achieve the objectives of education.

FO5. Subsidiarity ensures that decisions about the education of pupils are taken at the level closest to the point of delivery.

FO6. Effective Leadership and Management of a school ensures an excellent quality of education and high standards of achievement.

FO7. The Curriculum provides sufficient breadth and balance while enabling pupils, as they mature, to exercise increasing choice of the subjects that they wish to study.

FO8. The Teacher’s role must develop as pupils mature; changing from the dispenser of core knowledge to the facilitator of self-directed learning.

FO9. The reliable and valid Assessment and Accreditation of pupils’ work provides information about the individual pupil’s knowledge, skills and

understanding; it enables them to know what they have to do to improve and ensures access to the next stage of education.

FO10. An effective system of **Monitoring and Evaluation** provides an external validation of the quality of education provided and the standards of achievement of the pupils.

Once the **First Order Axioms** had been clearly articulated, it was apparent that they represented different aspects of the education system: fundamental aspects, structural aspects and functional aspects. Consequently, **Figure 2** illustrates how the **First Order Axioms** have been grouped into:

– **Fundamental Axioms**

- Pupils
- Education

– **Structural Axioms**

- The State
- Subsidiarity
- The School

– **Functional Axioms**

- Leadership and Management
- The Curriculum
- Teachers and Teaching
- Assessment and Accreditation
- Monitoring and Evaluation.

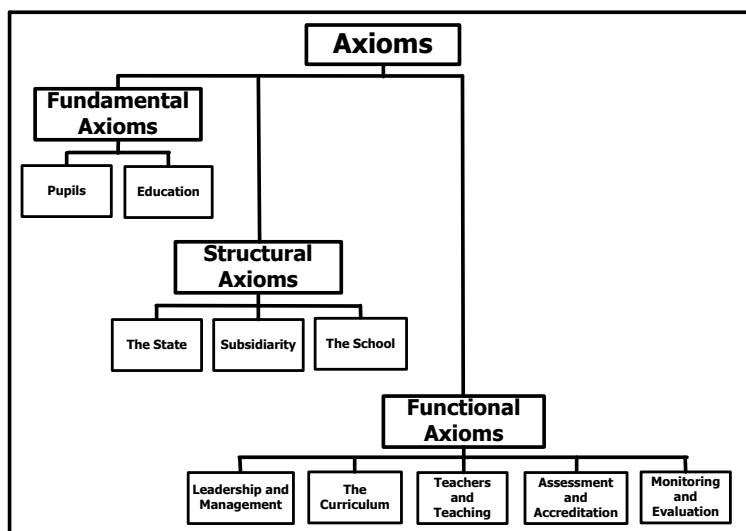


Figure 2. The Structure and Organisation of First Order Axioms

First And Second Order Axioms Of The Education System

The Fundamental Axioms

FO1. Pupils develop their knowledge, skills and understanding through a process of education and become socially adjusted individuals.

SOPu1. Pupils are naturally different and diverse.

SOPu2. Curiosity makes pupils learn almost without further assistance.

SOPu3. Pupils are inherently creative.

SOPu4. Pupils have the right to attend a **School** where everyone works together, knowing that all human beings are equal, valuable.

SOPu5. Pupils have the right to respect, kindness and courtesy: **Schools** in which every child matters, every day.

SOPu6. Pupils have the right to enjoy their learning, to feel cared for and protected and to have their achievement respected – in whatever form it takes.

SOPu7. Pupils have the right to an **Education** that celebrates diversity.

SOPu8. Pupils have the right to an **Education** that teaches about responsibilities, rights, personal integrity, duties and citizenship.

SOPu9. Pupils have the right to an **Education** that gives them the freedom to innovate and disagree; to think independently; and to exercise agency and choice;

FO2. Education enables students to maximize their potential and become well-adjusted members of society.

SOEd1. *The Education debate is conducted at three levels:*

– Philosophical

○ Why **School**? Is the primary purpose of education to benefit the individual or the collective society?

– Leadership and Management

○ the scheduling of classes

○ the blocking of time

○ the selection of textbooks

– Teachers and teaching

○ teaching methods

○ self-directed learning

○ project-based learning

○ outdoor education

SOEd2. Education is a means to empower **Pupils** to become active participants in the transformation of their societies.

SOEd3. Education also focuses on the values, attitudes and behaviours which enable individuals to learn to live together.

SOEd4. *The primary purpose of Education is to build up of the capacity of the individual for the benefit that individual.*

SOEd5. *The Education System has clear and measurable outcomes.*

SOEd6. *Pupils leave the Education System believing that they are good learners.*

SOEd7. *Pupils leave the Education System being independent and self-sufficient.*

SOEd8. *Pupils leave the Education System more capable of thinking clearly and making their own Choices.*

SOEd9. *The priority of Education is respect for the Agency of the individual.*

The Structural Axioms

FO3. It is The State's responsibility to effectively and efficiently allocate and delegate sufficient resources to enable schools to meet the personal, social and intellectual needs of the students.

SOST1. It is **The State's** responsibility to ensure that the resources allocated to **Education** are deployed efficiently and effectively.

SOST2. It is **The State's** responsibility to ensure that:

- equal educational opportunities are available to everyone;
- parents send their children to school;
- education is affordable for everyone;
- democracy is preserved; and
- a common social fabric is created where all are respected and accepted.

SOST3. When significant responsibility, authority and accountability is delegated to the **School**, **The State** determines the frameworks for:

- aims and objectives;
- policies;
- priorities;
- quality and standards;
- accountability; and
- the appropriate conditions for individual development.

SOST4. In **Education** systems that are characterised by The Local Management of Schools with Local Financial Management, The State develops:

- the legal framework for the establishment of Governing Bodies – local partners who support and challenge Leadership Teams in the discharge of their responsibilities.
- a Scheme of Delegation that specifies the rights and responsibilities of school Leadership Teams and Governing Bodies with clearly identified financial regulations and procedures.

SOST5. For those functions that require a national perspective, **The State** does not retain direct political control, it is delegated to non-ministerial departments, standing committees or working parties that report direct to parliament.

FO4. Subsidiarity ensures that decisions about the education of pupils are taken at the level closest to the point of delivery.

SOSu1. Subsidiarity is the principle that the Ministry of Education and Science should have a subsidiary function, performing only those tasks which cannot be performed at **The School** level.

SOSu2. Subsidiarity is the principle of social organization that holds that educational issues should be dealt with at the most immediate (or local) level that is consistent with their resolution.

SOSu3. When applied to the structure and organisation of the **Education** System, **Subsidiarity** is concerned with the delegation of **agency** and **choice** to **The School**.

SOSu4. The quality of the education system depends on delegating **agency** and **choice** to the level which is closest to the Pupil.

SOSu5. It is **The State's** responsibility to determine the structure and organisation of the education system and the levels to which **agency** and **choice** and their rights and responsibilities should be delegated.

SOSu6. The allocation and delegation of financial responsibility (Local Financial Management) is the most powerful indicator of the principle of **Subsidiarity** being in place.

SOSu7. The principles, the criteria and the formula for allocating resources are:

- open, transparent and objective; and
- reflect the real costs inherent in education.

SOSu8. The principle of **Subsidiarity** assumes that:

- improving the quality of education; and
- raising standards of achievement.

is the responsibility of **The School**. **The State** does not take centralized decisions on:

- the allocation of resources within **The School**;
- the detailed planning of **The Curriculum**; and
- different approaches to teaching.

FO5. The School creates the environment, opportunity and conditions that enable pupils, teachers and parents to interact and achieve the objectives of education.

SOSc1. Schools comply with national policies, expectations and standards.

SOSc2. Schools are self-organising, complex systems in a radically re-designed environment free of local municipal control.

SOSc3. Schools maintain a high quality of education and high standards of achievement within a cycle of continuous improvement.

SOSc4. Schools are age and stage specific.

SOSc5. Schools meet the requirements of **The Curriculum** and (for older Pupils) the requirements of the system of **Assessment and Accreditation**.

SOSc6. Schools are housed in suitable buildings with appropriately furnished classrooms and learning spaces.

SOSc7. Schools are future proof, they:

- provide increasing opportunities for independent learning in virtual classrooms;
- regulate the use of **The School** website, cloud technologies and social networks;

- ensure that **Pupils** can positively and confidently engage with the digital world; and

- ensure that **Pupils** have the skills and knowledge to effectively use digital technologies to participate in society, communicate with others and create and consume digital content

SOSc8. The future **School** develops a School Handbook to support and strengthen the relationship between **Schools**, local stakeholders and parents:

- the School Handbook outlines all national policies in addition to those school policies that apply specifically to their students.

SOSc9. The future **School** involves its stakeholders in School Development Planning.

SOSc10. The future **School** is dependent on a very high-level Management Information System that facilitates the exchange of information between:

- **Pupils**, teachers and parents; and
- **The School** and **The State**.

The Functional Axioms

FO6. Effective Leadership and Management of a school ensures an excellent quality of education and high standards of achievement.

SOLM1. There is a high correlation between the quality of **Leadership and Management** and organizational success.

SOLM2. Effective **Leadership and Management** are fundamental to improving the quality of education.

SOLM3. Effective **Leadership and Management** are fundamental to raising the standards of achievement.

SOLM4. **Leadership** is balanced by effective **Management**: the strategic and operational perspectives are closely interrelated.

SOLM5. Successful Leaders in Education are those who can balance principle, purpose and people:

- Principle – the moral basis of **The School**;
- Purpose – the core business of **The School**; and
- People – social relationships in **The School**.

SOLM6. **Leadership** is concerned with the values by which **The School** operates:

- personal values;

- the prevailing moral consensus in society; and
- the dominant moral hegemony.

SOLM7. Management is concerned with:

- translating principles into actual practice;
- ‘doing things right’;
- focusing on systems, structures and delivery.

SOLM8. Administration is about:

- doing all the routine tasks;
- the organisational routines; and
- infrastructure.

SOLM9. A team of local partners (a **Governing Body**) is established to support and challenge the **Leadership Team**; helping them to fulfil their responsibility for the leadership and management of **The School**.

SOLM10. The **Governing Body** is responsible for working with the **Leadership Team** to ensure that **The School** delivers:

- an excellent quality of education; with
- very high standards of achievement.

SOLM11. The **State** establishes a **National College for School Leadership**.

SOLM12. The **National College for School Leadership** develops:

- a curriculum (a body of knowledge, skills and understanding) that is the foundation for Leadership and Management in Schools;
- a National Professional Qualification for School Leaders that is a professional qualifying examination that teachers must pass before they apply for and are appointed to a post of **Headteacher**;
- a support programme for newly appointed Headteachers;
- a support programme for Middle Managers that enables Department, Faculty or Functional Leaders to improve their knowledge, skills and understanding of **Leadership and Management**.

FO7. The **Curriculum** provides sufficient breadth and balance while enabling students, as they mature, to exercise increasing choice of the subjects that they wish to study.

SOCu1. The **Curriculum** is broad and balanced.

SOCu2. The **Curriculum** promotes the spiritual, emotional, moral, cultural, intellectual and physical development of **The Pupils**.

SOCu3. The **Curriculum** prepares **The Pupils** for the opportunities, responsibilities and experiences of life by equipping them with appropriate knowledge, understanding and skills.

SOCu4. The **Curriculum** empowers **The Pupils** to achieve their potential and to make informed and responsible decisions throughout their lives.

SOCu5. The **Curriculum** is specified in terms of:

- an overarching curriculum aim;
- curriculum objectives;
- areas of learning and subject strands (contributory subjects);
- cross-curricular skills;
- thinking skills and personal capabilities;
- learning experiences to which **The Pupils** must be given to access; and
- attitudes and dispositions which **The Pupils** must be given the opportunity to develop.

SOCu6. The State determines the structure and organisation of **The Curriculum Framework** that provides **The Pupils** with the opportunity to choose the subjects that they wish to study as they mature.

SOCu7. Because **The Curriculum** for older **Pupils** is driven by external **Assessment and Accreditation**, **The State** specifies the content and assessment requirements of all subjects taught in schools.

SOCu8. Within **The School**, **The Teachers** plan in detail how and when they organise the content, the teaching and the assessment of **The Curriculum** in their subject.

SOCu9. The School is responsible for keeping the Governors, parents and **The Pupils** apprised of the structure and organisation of **The Curriculum**.

FO8. The Teacher's role must develop as students mature; changing from the dispenser of core knowledge to the facilitator of self-directed learning.

SOTe1. The State specifies the national conditions of service and remuneration under which **Teachers** are employed.

SOTe2. Teachers clearly understand and always act within the statutory frameworks which set out their professional duties and responsibilities.

SOTe3. Teachers make the education of **The Pupils** their first concern and are accountable for achieving the highest possible standards in work and conduct.

SOTe4. Teachers demonstrate consistently high standards of personal and professional conduct.

SOTe5. Teachers maintain public trust in the profession and maintain high standards of ethics and behaviour.

SOTe6. Teachers have proper and professional regard for the ethos, policies and practices of their school and maintain high standards in their own attendance and punctuality.

SOTe7. Teachers see themselves as members of a professional learning community that is committed to:

- ensuring that students learn;
- a culture of collaboration;
- focussing on results; and
- hard work and commitment.

SOTe8. Teachers value each and every **Pupil**; they own the responsibility to identify and develop every **Pupil's** positive attributes.

SOTe9. Teachers have consistently high expectations of **The Pupils'** attitudes to learning and standards of achievement.

SOTe10. Teachers have a deep knowledge and understanding of the subjects they teach. They plan lessons effectively, making maximum use of lesson time and coordinating learning resources.

SOTe11. Teachers question **The Pupils** effectively and demonstrate a clear understanding of the ways they think about the subject.

SOTe12. Teachers manage **Pupils'** behaviour effectively with clear rules that are consistently enforced.

FO9. The reliable and valid Assessment of pupils' work provides information about the individual pupil's knowledge, skills and understanding; it enables them, their teachers and their parents to know what they have to do to improve and it ensures access to the next stage of education.

SOAA1. Formative Assessment provides **The Pupils** with accurate information about their knowledge, skills and understanding.

SOAA2. In order to motivate **The Pupils** into raising their standards of achievement, **Formative Assessment** is accompanied by developmental marking.

SOAA3. Reliable and valid **Formative Assessment** provides very important feedback for the teacher and allows parents to follow their children's progress and to be aware of their standards of achievement.

SOAA4. Summative Assessment undertaken at the end of the module, course, year or school provides:

- a measure of **The Pupils'** standards of achievement;
- the teacher with an indication of any weak areas in the quality of their teaching; and
- the Leadership Team with an early indication of any teacher who is beginning to fail in the classroom.

SOAA5. When it is analyzed and presented effectively, reliable and valid **Summative Assessment**, provides parents with appropriate information about:

- the strengths and weaknesses of their children; and
- the strengths and weaknesses of schools.

SOAA6. National (**State**) examinations fulfill the following functions, they:

- **Accredit** the knowledge, skill and understanding of the **Pupils** in a particular field, subject or profession;
- allow **Pupils** to be awarded a diploma, degree or qualification that acknowledges the level attained;
- function as an 'entry ticket' to the next stage of education.

SOAA7. The School presents to Governors, parents and **The Pupils**, the results of any evaluation of **The Pupils'** performance in National (**State**) examinations.

FO10. An effective system of Inspection provides an external validation of the quality of education provided and the standards of achievement of the pupils.

SOME1. The State's provides reliable and comprehensive information about the efficient and effective deployment of tax-payers' money.

SOME2. Schools have significant autonomy and are therefore fully accountable for the results of their activity: this is only achieved when there are periodic **Inspections**.

SOME3. Inspections provide an evaluation of the extent to which each **School** has achieved its goals: this motivates **The School** to search for ways to improve their outcomes.

SOME4. The Inspection of Schools performs five essential functions it:

- provides parents with information that informs their choices and preferences about the effectiveness of **The Schools** their children attend or will attend in the future;
- keeps **The State** informed about the work of **The Schools** which provides assurance that minimum standards are being met;
- provides confidence in the use of public money;
- assists accountability; and
- promotes the improvement of individual **Schools**, and the **Education System** as a whole.

SOME5. A State that introduces a system of independent **School Inspections** first establishes a non-ministerial department that is **independent** of the Ministry of Education and reports directly to **Parliament**.

SOME6. It is Parliament that appoints a **Chief Inspector of Schools** who is directly and indirectly responsible for evaluating and reporting on the work of the Ministry of Education.

SOME7. Therefore, the Chief Inspector of Schools is independent, and is seen to be independent, of the Ministry of Education.

SOME8. In an open and transparent process, the Chief Inspector of Schools is responsible for:

- the development of a **National Framework for the Inspection of Schools**;
- the appointment of a team of highly qualified and experienced inspectors;
- the development of a comprehensive training programme to ensure that the inspectors are properly equipped to fulfil the role; and
- establishing internal procedures to ensure the quality of any published reports.

An Overview

This paper set out to investigate the strengths and limitations of **Axiomatizing the Education System**. It started by providing a set of **Axioms** about **Axiomatization** itself; for example:

A5. Axiomatization is the formulation of a system of statements (i.e., **axioms**) in order that a **consistent** body of propositions can be derived deductively from these statements.

A7. An axiomatic system is called **complete** if every statement, or its negation, is derivable from the system's axioms (that is to say, every statement is capable of being proved to be true or false).

A9. To axiomatize the education system is to demonstrate that its claims are derived from a well-understood set of sentences, basic concepts/terms and the rules of logic – **First Order Axioms**.

A10. In order to apply to the education system, **First Order Axioms** are substantive assertions about aspects of the system.

By providing a convenient overview of **First and Second Order Axioms**, Table 2 illustrates to extent to which this has been successful, for example:

A16. Each **First Order Axiom** is followed by the list of subordinate **Axioms – Second Order Axioms**.

However:

A16 (cont'd). Because the education system is so large and complex, the number of **Second Order Axioms** is (seemingly) endless. Furthermore, **Second Order Axioms** are not always **independent** and are clearly related to the **Second Order Axioms** subsumed under other **First Order Axioms**.

Furthermore:

A5. It is possible to formulate of a system of statements about education, but they are not derived deductively from prior statements.

A9. It is not possible to demonstrate that the **First Order Axioms** are derived from the rules of logic; nor that

A11. The **Axioms** follow **logically** from a number of statements that are in turn the **logical** result of other statements.

This is probably the stage at which it must be concluded that it is not possible to 'Axiomatize the Education System' in any meaningful way; the process cannot comply with the demands of axiomatization. It is time to change the terminology and use 'A Taxonomy of Educational Objectives' and First and Second Order Statements.

A careful reading of the main text and Table 2 indicates that some **Second Order Statements** subsumed under a particular **First Order Statement** are closely related, if not identical, to **Second Order Statements** subsumed under other **First Order Statements**. For example: there is a close relationship between

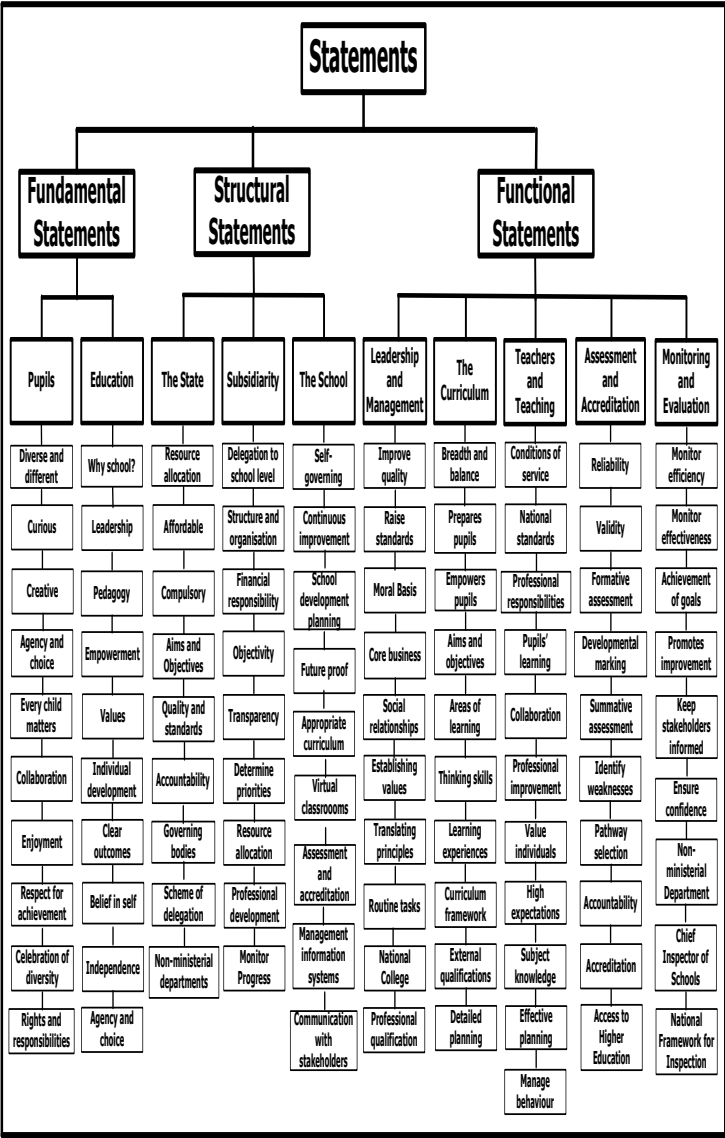
The State's responsibility for Quality and Standards;

The School's responsibility for Continuous Improvement;

The Leadership and Management Team's responsibility for Improving Quality and Raising Standards;

Teachers' responsibility for having High Expectations of The Pupils;

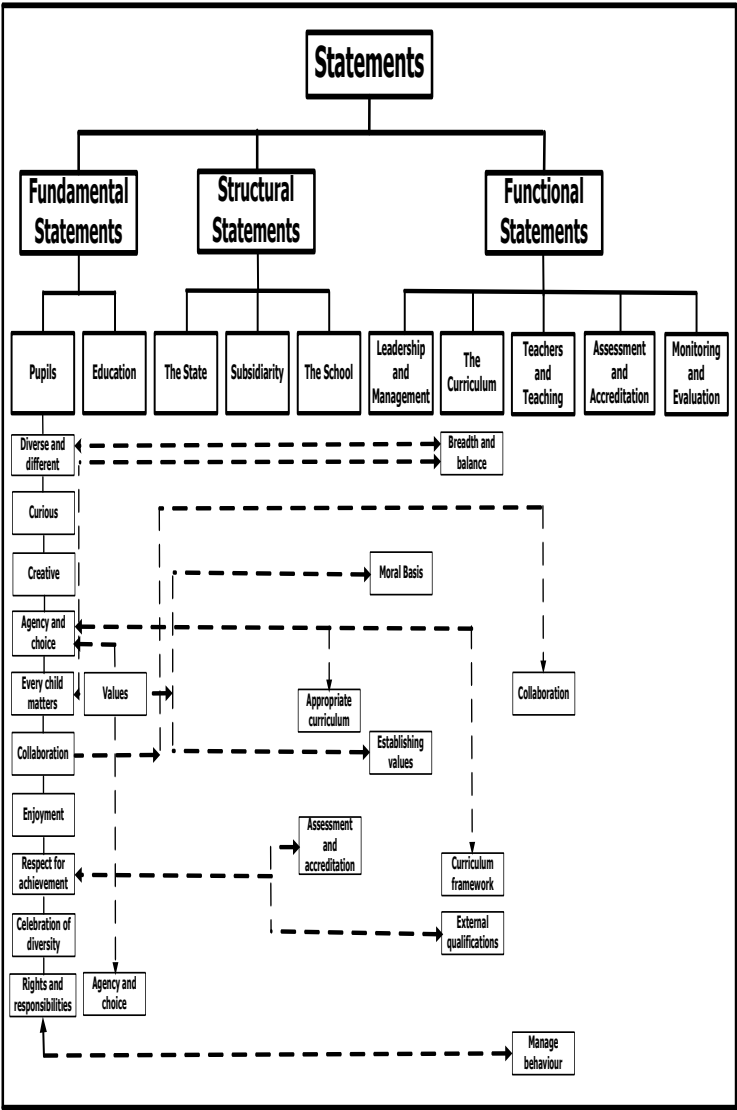
Table 2. The Overall Structure of First and Second Order Statements



The role of **Assessment and Accreditation** in **Identifying Weaknesses**; and
The role of **Monitoring and Evaluation** in **Monitoring Effectiveness**.
Similarly:

Table 3 illustrates the relationship between **Second Order Statements** that are subsumed under **Pupils** and **Second Order Statements** that are subsumed under other **First Order Statements**.

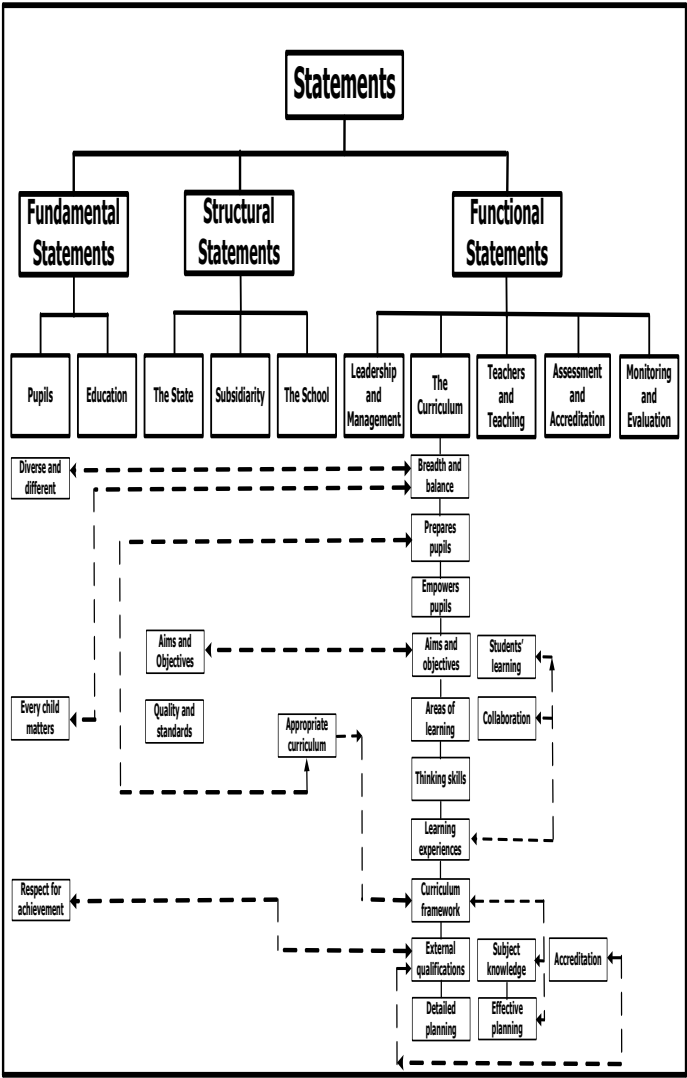
Table 3. The Connections between Second Order Pupil Statements and some other Second Order Statements



Furthermore:

Table 4 illustrates the relationship between **Second Order Statements** that are subsumed under **The Curriculum** and **Second Order Statements** that are subsumed under other **First Order Statements**.

Table 4. The Connections between Second Order Curriculum Statements and some other Second Order Statements



The Process. The stages in the facilitated workshop:

1. the generation of the key features of the education system;
2. grouping those key features into cognate groups; and
3. ascribing a title to each group

are, in themselves, very productive and provide a high-level **Taxonomy of Educational Objectives** that could be part of:

- a) the professional development of politicians, administrators, school directors, teachers and students; or
- b) a school-based in-service programme where the staff are divided into cross-subject groups to generate their own structure and organisation for the key features of education.

The objective would not be to generate the single correct answer; it would rather be to facilitate an open and transparent discussion about the key issues that arise during the process.

The Product. The process indicates that it is certainly possible to:

A4. take a body of knowledge and work backwards towards its **Statements**.

However, because the education system is so large and complex and so many **Statements** can be generated that it is,

1. impossible to ensure that any particular **Taxonomy** provides a **complete** analysis of the education system;
2. impossible to ensure that the **Second Order Statements** are **independent**;
3. impossible to derive the **Statements** logically from a number of statements that are in turn the **logical** result of other statements.
4. certain that alternative, and equally valid structures could be generated by different groups of participants.

That no single **Taxonomy** can be used to describe and interpret every aspect of the education system does not render the approach redundant; The **First and Second Order Statements**, that are summarized in Table 2, provide a powerful description of the education system.

A different group of participants in a different facilitated workshop may produce a different collection of key features of the education system and, therefore, different 'cognate groups'. These alternative perspectives could actually be useful in a school-based in-service event, where the different groups might produce very different versions of Table 2. This very outcome could then form the basis for a plenary session at the end of the event.

An alternative approach would be for the workshop organiser to facilitate the generation of short statements; but at the end of that stage specify the cognate groups that are to be used; for example:

- Raising Standards of Achievement.
- Improving the Quality of Education.
- Professional Development.

- Future Proofing.
- Every Child Matter.
- Agency and Choice.
- Delegation to the Local Level.
- Aims and Objectives.

These would then become the **First Order Statements** in an alternative Table 2.

A third approach would be to restrict the actual title of the facilitated workshop to a narrower **Statement**; for example, **Raising Standards of Achievement, Future Proofing or Pupils with Special Educational Needs**, and use the process to generate a programme or course of action. Essentially, this would generate **Third Order Statements** of the education system.

In Conclusion

It is not possible to **Axiomatize the Education System**. The system is so complex that too many of the requirements of **Axiomatization** cannot be met. However, the process would be very useful in:

1. producing a **Taxonomy of Educational Objectives**;
2. providing a high-level description of the education system;
- and
3. the professional development of politicians, administrators, school directors, teachers and students.

NOTES

1. Facilitated workshops are powerful means of achieving consensus among the participants as to the key features of the education system.

REFERENCES

BUDGELL, P. and KUNCHEV, M., 2019. *General Theory of Education, Annual Professional Development Meeting for Teachers and Principals*. Plovdiv: America for Bulgaria Foundation.

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