Design Education Research Note 2

Design Education:
the relevance of the Froebelian model

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Introduction

Current interpretations of design education fall into several distinct categories:
(a) as a widening of craft education which builds upon traditional practices and ideologies (Eggleston, 1976),
(b) as a changing role for art education as it responds to the needs of a changing society (Green, 1974),
(c) as a response to needs for training people, generated by the industrial demands of a highly competitive nation involved in world trade and world politics (Corfield, 1979).
Also there has been recently, a growing movement which attempts to develop a more comprehensive interpretation of design education, based on an interdisciplinary approach to design studies (Baynes, 1976).

An interdisciplinary approach to design studies would appear to be a sensible suggestion, and one which bridges many interests. But is is difficult to see how such an essentially eclectic approach, relying upon the use of the tools and procedures of varying disciplines can lay the foundations for the establishment of identifiable 'designerly' procedures and modes of enquiry. Archer (1976) maintains that without the foundation of a scholastic or academic base upon which to build, Design, as an area of knowledge, cannot develop beyond superficial eclecticism. At the core of his argument are the assertions that design education is a neglected and important third area in education concerned with doing and making, that modelling is its natural language, and that this language is equal to and separate from, but interacts with literacy and numeracy for expressive and communicative purposes.

From a survey of the literature available for teachers and intending teachers of design, there can be seen to be a lack of an educational approach to the teaching of design (Cross, 1978). This is reflected in a noticeable lack of reference to educational theory and research in the practice of design teaching. It is also reflected in a tendency to regard the history of design education largely in relation to the history of those institutions specifically concerned with the teaching of craft, art and technical subjects (Macdonald, 1970). Influences governing the growth of these institutions have been various, but often more associated with perceived national needs for a trained workforce rather than with the development of educational ideas. (Power, 1970).

Tracing the history of practical work in schools leads to the ideas of two men: Johann Heinrich Pestalozzi (1746-1827), and Friedrich Froebel(1782-1851). It is important however, that a distinction should be made at this stage between the nature and influence of Pestalozzi's ideas and those of Froebel, since that distinction represents an area of confusion which can still be found to exist today in design teaching. It was largely due to the influence of Pestalozzi that the establishement of manual training schools, technical schools and industrial schools of all kinds spread throughout Europe and the United States during the middle years of the nineteenth century. The object of such schools was, to a large extent, social reform through education. They sought to give the poor the means to support themselves. Manual training was seen as a preparation for industry or a life of work and its place in the process of education, therefore, was to unite school work with the future life of the individual. (Quick, 1907).

It was due to the impetus and influence of Froebel's ideas however, that school workshops [1] serving broader educational purposes became widespread. Froebel maintained that the real

value of manual work lay not so much in the objects produced, as in the knowledge and understanding gained by the individual from the processes involved by handling the materials. Whereas Pestalozzi aimed at improving physical skills for practical purposes, Froebel believed that the development of such skills was only a part - a vital part however - of a much broader and more complex developmental process which required careful educational treatment. These two opposing philosophies have since co-existed in confusion, the one often providing an educational front for the more limited practices of the other.

If for no other purpose than to lessen confusion by clarifying 'educational' philosophy against other philosophies which are prevalent in design teaching, Froebel's work deserves closer scrutiny. However in the light of present day interest in design education, Froebel's system of education may offer more than mere polemic. It offers a model which clearly demonstrates how educational practices can and must be related to, and grow out of a deeply considered theory of education, which itself is guided by a larger and more generalised philosophy.

Primarily, Froebel's system of education was intended to serve as a flexible model upon which to build. It is a system which has been tried and developed, which had great impact upon general educational thought and practice in Europe and America, and is well documented. It emphasises strongly the importance of self activity, doing and making, and indeed recognises 'modelling' and the expression of ideas through the use of materials, as the most natural of expressive languages or means of communication. Indeed it has been suggested that the powerful design ability of the architect Frank Lloyd Wright can be credited largely to his

early education which made use of the Froebel kindergarten techniques. (MacCormac, 1974).

That Froebel's educational ideas and aims have had minimal impact in the area we now term design education, may be due to prevailing interests and arguments which in the nineteenth century Froebel, in designing his system, attempted to challenge, but which today are still familiar. Hailmann (1887 p. 36), gives the arguments prevalent at Froebel's time as follows:

'Froebel's demand for manual training in education has been adopted quite generally. However the utterances of this need relate largely to industrial considerations. It is claimed that the chiefly literary character of school education does not meet the demands of the worlds industrial interests; that there is a dearth of talent and skill in industrial pursuits, and a consequent excess of applicants for the learned professions and for commercial and clerical work; that labour is shunned as degrading, instead of being sought as ennobling and that consequently pauperism and crime, as the results of enforced idleness, are on the increase'.

However much strength there was and still may be in these claims and arguments, strictly speaking they do not help to direct discussion toward genuine educational issues. Froebel's interpretation of the need for practical activity as an educational factor attempted to do this, by going much deeper in a demand for a balanced development of the individual in all relations to life. Whilst skills and abilities useful for the needs of industrial pursuits are an undeniable outcome, to aim to produce them for these purposes is not an educational aim as such.

Criticisms against the literary nature of traditional

educational provision, in an attempt to win support for practical training, often reveal aims which may or may not be educational. Froebel's own awareness that practical education was neglected by traditional educational provision cannot be taken to mean that he undervalued the spoken language. (Froebel 1886 p. 99-100). Rather he attempted to balance education by proposing the use, in learning situations, of other models of the world than just words. The development and use of models other than literacy (and numeracy) constitute a more tangible language which plays an important role in cognitive development and the growth of knowledge and understanding in the individual. Froebel's aims therefore are undeniably educational in the broadest sense.

Similar arguments criticising the weighting of educational provision in favour of literacy and numeracy as against practical education have extended throughout history. Plato, Rousseau, Pestalozzi, Robert Owen, John Dewey and Henry Morris, amongst others, and all with varying motives and shades of argument, have attacked the emphasis placed upon literacy and numeracy in education. Archer's (1976) argument for design education, entitled 'The Three Rs' - Reading, Reckoning and (W)roughting, was preceded in fairly recent history by Patrick Geddes' argument for education in 'The Three Hs' - Head, Heart and Hand [2]. Arguments similar to Geddes' were influential in bringing about the establishment of non-academic Secondary Modern Schools in the post-Second World War years, and can be found reflected in the more recent Newsome Report (1963).

It has therefore been a recurring theme in the formulation of our educational system that children should be trained 'to do', and it is one which is becoming increasingly insistent as the apparent problem of sustaining national industrial growth increases. A recent use of the argument illustrates that this

climate of opinion persists. In a newspaper article prefaced with, 'If the standard of living in this country is to be maintained, let alone increased, then the industrial base of Great Britain must be expanded,' Pope (1979) suggested that 'it may well be that for certain types of children the book learning approach would taper out early on. Indeed it may never be kindled at all, thus making way for an entirely craft-based training which would prove to be far more stimulating for those children!'

It would therefore seem to be of some importance in this area called Design to separate and clarify <u>educational</u> aims, motives and practices from those which masquerade under the same title, but which more deservedly belong to emotive categories such as social engineering.

The Froebelian Model

Froebel's system of education was outlined only for the first stage of the individual's development, i.e. up to and including the kindergarten stage. However in his book 'The Education of Man' (1816) Froebel's early thinking indicates that his system was originally intended to be developed and applied at successive stages of growth and development. His personal efforts were directed toward establishing a sound base; he began at the beginning, providing a guide for the early development of babies in 'Mutter - und Kose-lieder' (Mothers' Songs, Games and Stories) (Froebel, 1900). The successive stage was early childhood and it is for his establishment of 'Kindergartens' that he is most well known.

Although he provided a highly structured system of education he maintained that his was a flexible system, a model upon which to build with scientific modes of thought and a greater knowledge of psychology, nature and life. The word structured as applied here may be stripped of many of the emotive connotations which today are associated with the antiquated control exercised by teachers in the practical application of Froebel's principles and theory. 'Control' at this superficial level soon gave way to modification and developments in practice, as the Montessori system later demonstrated. Instead, the structure which is of some interest can be seen in the completeness of the educational model; the unity between the underlying philosophy and theory, and their constant relationship to the work schemes and methods of practice. By today's standards the extreme control demonstrated by fixed exercises in analysis and exploration would require a degree of classroom discipline

which is unrealistic and undesirable. However the principle of an orderly progression reflected in the structuring of activities and the establishment of developmental sequences as a result of logical and preconsidered approaches remains valid.

In attempting to scan this educational model, therefore, the aim is not to propose a regression into nineteenth century practices. Rather it is to explore the work of a man who in his aims and practices attempted to lift activity, creativity and design into a balanced position in the process of education. Having understood the basic aims and objectives of this particular model, we may then be a little better prepared to devise ways in which modern design education may be guided by similar sound educational principles.

Froebel's practical techniques and his central educational principles stemmed directly from his total vision of the world, which was essentially based upon nineteenth-century religious beliefs. Consequently the reading of his works over a century later involves a clash of world views which is the result of the growth of knowledge and understanding and the diverse influences of thought in the 130 years since his death. To complicate matters further, Froebel was not a systematic philosopher, nor was he much interested in arguing his views. He was an idealist in that, for him, the meaning and value of every part of his educational doctrines lay in his central faith. He also had a profound respect for Science, its methods and procedures, and he reconciled religious belief with scientific understanding in an interpretation of science as an instrument of God.

In 'The Education of Man' Froebel attempts a somewhat condensed and not always very lucid statement of his beliefs and ideas.

It is difficult to read. The style is stiff and turgid; at times given to sentimentality; always written with an air of fervent conviction; and often the marriage of Science with God results in theological/scientific phraseology which effectively blocks understanding.

Nevertheless, his practical work was instrumental in bringing about a dramatic change in attitude toward the development of children and young people. It helped to create a climate in which general educational thought was to change; it laid the foundation from which theories of educational psychology have subsequently developed, and although many of the applications of Froebel's educational principles have now been discarded, the principles themselves have retained their vitality. Although we can now justify the same educational principles, e.g. self activity and continuum of development, on quite different grounds, ie, in the light of psychological research and the knowledge gained from subsequent educational experiments, in so doing we are replacing his educational philosopy and theory with one of our own. Also, to remove individual activities and apparatus from the context of the developmental sequences of which they are each a part, is to remove the 'design solution' from the 'design problem' to which they relate and thereby deny the value of the model. For these reasons therefore it is worth looking directly at Froebel's work before we can draw any conclusions as to its value according to criteria which are culturally distanced from those of the nineteenth century.

Philosophy

'Education consists in leading man as a thinking intelligent being, growing into self consciouness to a pure and unsullied, conscious and free representation of the inner law of Divine Unity, and in teaching him ways and means

there to' (Froebel, 1826).

The principle of 'Unity' in all life and the translation of this principle into the work of education is the chief characteristic of Froebel's work. In the broadest philosophical sense - and perhaps oversimplifying his views - Froebel believed that the Universe was the manifestation of God. Unlike other forms of life, human beings alone could achieve a consciousness and understanding of their own Divinity or being, and they existed purely to do so. By self determination, self activity and a consciousness resulting from observations of human growth and development, by freely developing every aspect of the human nature through its progressive stages, and in relation to the community, individuals would achieve this knowledge and purpose in life.

Since man is a conscious being, with an inner and an outer life, the activities whereby he achieved this growth would be of two kinds which must go on side by side:
(a) starting from within, he must constantly seek to embody in outward form the knowledge and understanding he has gained about the world and himself in relation to it. So in many differing ways he must depict, fashion and create.
(b) on the other hand he must strive to take within himself the picture of the world he finds outside himself - to discover in it the laws and forms by which life manifests itself.

This rough outline barely does justice to Froebel's own variations on his themes, his elaborations and passionate belief in them. However this view of life leads directly to the formulation of an educational theory which in itself is understandable without the religious excesses embodied in

Froebel's world view.

Theory

It was in the formulation of an educational theory, embodying certain central principles that Froebel anticipated to some extent the future work of Piaget and Susan Isaacs. Undoubtedly influenced by the scientific thinking which gave rise to Charles Darwin's 'The Origin of Species', Froebel thought that intellectual as well as physical development was of an evolutionary nature. He proposed that the individual's development progressed in successive stages and that each particular stage of development required educational treatment relevant to it. Each stage built upon that which had gone before, and such progressive development was manifested in an increase in complexity of mental and physical structures - an improvement in power, skill and variety in the performance of natural functions.

Educational practices should therefore seek to develop human capabilities and abilites from the earliest years, Froebel suggested, in a carefully graduated and connected progression in all directions. The natural development of mental and physical growth should be encouraged by the provision of a suitable environment and fitting means for those activities necessary for development. Instruction should neither prescribe nor restrict, and any practices which interfere with natural and individual development should be excluded. His view was that 'God does not cram in or ingraft, he develops the smallest and most imperfect thing in continuously ascending stages and in accordance with external laws grounded in and developing from the thing's own self.'

Five main principles are contained within Froebel's theory and it is these principles which his concrete techniques and apparatus attempt to translate into practice. The complete integration of all five principles in practical application makes it difficult to separate and discuss each in isolation from the others. Explanations therefore overlap, but broadly these principles fall under the headings

(a) Self activity of the mind
(b) Connection and continuity
(c) Creativity
(d) Physical activity
(e) Environmental harmony

(a) Self Activity: In his observations of young children, Froebel's attention was drawn to the restlessness and desire for activity which is demonstrated by their play. Through games, songs, group and solitary activities, he deduced that the young come to know the external world, and the physical qualities of objects which surround them. They become familiar with the motions, actions and reactions each upon the other of objects in the physical world, and the relation of these phenomena to themselves. In and through play the young child learns to contrive means for securing his ends, to invent, construct, discover, investigate; to bring his imagination to bear upon the unfamiliar and further to translate the language of facts into the language of words. (Bowen, 1893, p101).

Froebel therefore made games and play the means by which his educational ideas might be put into practice. He collected, invented and modified games and activities which would:

(i) bring about the exercise and development of intellectual abilities and growth of knowledge. These activities he

structured, sequenced and called 'Gifts' (see Appendix).
(ii) instigate processes for producing skills in the use and expression of knowledge - these he called 'Occupations' (Appendix). Through the medium of these gifts, occupations, songs, games and play with all kinds of materials, self active growth in all directions of being would occur.

(b) Connection and continuity: In 'The Education of Man', Froebel talks broadly about education as a process which is continued throughout life. In the concluding paragraph of his book he declares his intention to apply his principles to the educational provision necessary for the complete development of man. Although he himself confined his efforts to the understanding of, and practices applicable to the earliest years of life, neither he nor his disciples would allow that his principles ceased to apply as soon as the child emerged from childhood. To hold such a view is to invalidate those principles for the period of infancy itself.

Connection and unbroken continuity of succession are fundamental ideas, and although the ways in which a principle is applied must vary as the child changes and grows, the principle remains the same. It must lend itself to changing circumstance and material, moving forward 'in fitting stages of development and cultivation, always keeping harmoniously in touch with the growth and knowledge of the pupil'. (Bowen 1893, p81). Educational practice should therefore be made 'with reference to all stages of development and age without breaks and omissions and should consider the fact that the vigorous and complete development and cultivation of each successive stage depends upon the vigorous, complete and characteristic development of each and all preceding stages of life'. (Froebel, 1826, p28).

In the process of learning, at each stage of development the

aim is to combine, integrate and understand; to apply comparisons, marshall and arrange what is discovered and observed; ask connecting questions, see links and relationships and respond to natural forms. Through the actions he devised, Froebel aimed at applying this principle by ensuring;

(i) Logical succession from the simple to the complex, from concrete to abstract and from known to unknown.

(ii) An awareness of the interrelationships between subjects of knowledge - every subject giving meaning and value to all the others.

(iii) Union between different kinds of mental activity - knowing, feeling and willing - enabling them to blend.

(c) Creativity: In the process of expressing, designing and making, the means are built of establishing and maintaining a link between the inner consciousness of a being and the outer perceived realities. Self activity enables observations and explorations to take place, but for 'development', something more than perception and 'taking in' is needed. More of the human being is required to be active if expression is to be given to ideas and mental images, and if the language for expression is to develop and become fluent. The value of 'doing', of making new forms from imitation to original invention, is therefore to allow the exercise of both mental and physical faculties and to connect inner mental activities, ideas and feelings with the external environment of learning.

It is difficult to separate 'Creativity' from the justifications Froebel gives for self activity. Certainly he recognises intellectually the distinction between the two and the value of fostering the expressive faculties of the individual in his theory of education. But his applications of the

principle of creativity, tend to be suggestions of new things to the child rather than allowing expression of the child's own thoughts or the growth of independent ideas. For example, in the use of small cubes, the child is instructed in detail how to build specific models (eg, chair, church, castle, steps).

It is clear that Froebel's observations of children led him to notice that self-directing abilities were slow in growth and therefore activities should be prevented from becoming vague, erratic, meaningless or destructive. But it is difficult to see - given the degree of control he suggests in creative activities - how he reconciles his intellectual conception of creative freedom with the practices he suggests. For example in the building games he devised (see Appendix) he would not allow the destruction of old forms, in order to create new ones from the same materials. In this way he attempted to encourage patience, thoughfulness and a respect for things already existing. It is debatable whether such aims are in agreement with the fostering of creative impulses.

(d) Physical activity: Froebel's emphasis upon the value of physical activity extends beyond a recognition of the value of bodily exercise and its relation to physical health, to an understanding of the important role played by the senses in receiving information from the environment. The hand and sense of touch were carefully exercised with craft work, construction activities, the use of materials of differing textures and properties of behaviour, fluids and experiences of different temperatures. The eyes were educated with studies of colour, form, perspective and dimension. The ear with the perception of sounds, song, music and silence. The rearing of animals and the cultivation of plants in a natural environment afforded opportunities for all the senses to be

used to gain knowledge and understanding. Movement and gesture as the expressive medium of ideas and feelings was encouraged with music and dancing, which was preferred to gymnastics for purposes of gaining physical exercise.

(e) Environment: A happy and harmonious environment was to be created for the ongoing activities which Froebel recommended. Large warm rooms indoors, and open spaces, fields and gardens shaded by trees outdoors, would provide an environment for experiences, rather than passive abstract learning and instruction. Furniture would be suitable for the size and needs of the pupils, and the orderly storage and use of materials and apparatus. Froebel's detailing of the environment went so far as to specify that animals for rearing and study should be housed according to their special needs and that the care and maintenance of them should fall to the children under the direction of the adult teacher.

Aims

Froebel's aims of education, as expressed by his basic principles, can be reduced to three:
(a) The acquisition of knowledge
(b) The development of mental and physical capacities
(c) The development of skills, or effectivness in doing, especially in the application of knowledge to practice.
The close interdependence of these aims, woven as they are into a practical plan for activies, makes it impossible to separate any one activity, or set of activities, from the others and allow it to retain its educational value. Therefore the value of each of the various components of the Froebel system can only be fully understood within the context of the complete model, ie, in the context of the educational philosophy and theory which bear upon their design.

Practice

After the publication of 'The Education of Man' in 1816, Froebel continued to develop his theoretical framework, and, relating to it, methods which would translate it into practice. Between the years 1825-50 he devised the series of activities and associated equipment which he called 'Gifts' and 'Occupations'. The design of these educational aids was itself an evolutionary process in the sense that they grew and became modified as Froebel refined and expanded his theory.

One example of how theory is translated into practical activities, and the way in which method of practice grows also from a theoretical base, is demonstrated by one theoretical component 'The Doctrine of Contrasts'. According to Froebel, knowledge is information taken in and assimilated. Information only becomes knowledge when its meaning has been mastered - when its bearings on other facts have been realised, and when it is understood in such a way as to put it to simple, natural use. In order to understand anything we note its likeness and differences to other facts and things - its relations to them. We classify it with its likes and distinguish it from the unlike.

Froebel's understanding of cognitive growth - in this example, concept formation - is very simple. Nevertheless he was writing before the establishment of the science of psychology and such work constitues a pioneering effort. In relation to the development of this cognitive ability Froebel introduced his 'Doctrine of Contrasts', (Hailmann 1887 pp. 42-4) which is demonstrated in degrees of progressive complexity in the 'Gifts' and related activities. He juxtaposes, for example, hardness with softness, light with dark, rest with motion, and maintains that by their contrast

each is rendered more noticable and more intelligible. He begins with the most striking contrasts and gradually as observational abilites grow he reduces the amount or degree of difference to be noticed. At the same time he attempts to reconcile the opposites, eg.
purple reconciles red and blue,
warm reconciles hot and cold, and a
cylinder reconciles sphere and cube.
This reconciling mean is found by active experiment, observation and discussion. Therefore to make anything intelligible, to establish and maintain relationships between subjects, objects, or facts already known, the relations must be made clearer by adding new facts and bringing out new connections.

In the first and second Gifts the simplest notions of the 'Doctrine of Contrasts' are embodied. The apparatus of the first gift consits of six soft woollen balls of different colours, three primary and three derived or secondary. The primary colours are all contrasted in turn and the reconciling colour, derived from each pair is placed between them. In the second Gift, the objects are of hard wood and consist of a sphere, a cube and a cylinder.

The sphere is the known object. It is larger than the balls of the first gift, hard whereas they are soft, smooth as opposed to rough and heavy instead of light as the earlier balls were. When it is dropped on the floor it makes a different noise, and generally it behaves in quite different ways than the woollen ball.

When all this has been observed the cube is introduced and comparisons are made. Differences of shape and movement are noticable; the sphere is round, has one surface, no edges, easily moves and rolls, the cube is not round, has

several surfaces and edges, is not so easy to move and it slides.

The third object, the cylinder, reconciles the other two since it contains certain characteristics of both. It links them together, yet it differs from each. Like the sphere it has a round surface and can roll, but only on its side. Like the cube, the cylinder has flat surfaces, edges and corners. With regard to movement it is capable of sliding, but only on its two ends. Suspension of the three objects on a string at various points on their surfaces allows further comparisons to be made and in this way notions of space, form, motion and their general relationships are built up.

Bowen (1893, p145-6), summarises Froebel's account of the conditions a true Gift should satisfy. 'It should enable the child to interpret the external world around him, and to give expression to the world within him; each should as far as may be, include those which have gone before, and foreshadow those which are to follow; and each should readily make prominent the idea of a whole - of a whole made up of parts going together to make up an orderly whole'. Bowen makes it clear that Froebel included the 'Occupations' as part of the total conception of a 'Gift': 'The condition of 'Expressing the world within' however, includes the occupations as well as the gifts; and Froebel himself never made any clear distinction between them. Gifts and occupations are undoubtedly very closely connected; and indeed unless the latter **are** treated as direct applications to practice of what has been learnt from the former, they are liable to have very little educational value whatever ...'

Essentially then, the Gifts and Occupations are educational aids to learning which were designed to be used together. The Gifts (see Appendix) allow arrangements of materials whose

individual shapes do not change, in order to demonstrate relationships and to draw out information from the material surroundings. Use of the gifts follows a definite order of progression, from simple to complex. The growth of ideas is therefore intended to be gradual and matched by an equally progressive growth in powers of construction and understanding. The Occupations deal with materials which are easily changed in form and are used to consolidate, translate and develop those ideas associated with the more formal work of the Gifts. Although Froebel suggested many activities for Occupation work (Kraus-Boelte and Kraus, 1888), any practical activity which allows the use of flexible materials to transfer and develop what has been learned from the Gifts can technically be called an Occupation.

Twentieth Century View

Contrary to what the wider philosophy and educational theory might lead us to believe, Froebelian practical education as it was exercised in the nineteenth century and early twentieth century was not permissive and passive. As Froebel presented it, it was a formidable didactic scheme, with rules of application, extreme control in activities and an extensive syllabus of later formal instruction. The practical application of the theory and its principles emphasise mathematical and logical relations to such a degree that the development of other aspects of the scheme, well recognised in the overall plan, tend to be subordinated. The rules and control which govern the practice lend themselves to mechanical use by the ill-trained or uninformed, and despite the debt which is owed to Froebel as a pioneer amongst those who insist upon direct study of the child throughout all stages of development, the scheme shows itself to be based upon insufficient knowledge of physiology and psychology (Isaacs, 1952).

For example, drawing for older children most often is reduced in the Froebel system to work in chequers, with straight or curved lines, and there is an emphasis upon simple geometrical forms. This is on the assumption that things are seen in outline instead of as masses of colour, light and shade. Consequently painting - or colour work with brush or chalk - is not usually done without a previously marked outline. Similarly, the rejection of Froebelian 'point work' such as perforating, bead work, and use of seeds and lentils with young children is due to the fact that such work places an unhealthy strain upon immature eye mucles. Also the muscular co-ordination necessary for the handling of such materials cannot be expected to be sufficiently developed at such an early age as kindergarten level.

Nevertheless, Froebel's ideas of the evolutionary nature of growth and mental development, his attempts to tailor educational experiences according to the needs of the pupil, at whatever stage of development, and to build upon preceding stages, forshadowed the growth of educational psychology. Later work such as that of Piaget, Isaacs, and Dewey, built upon these basic ideas. They established scientific procedures for devising experiments, collecting data, and measuring and assessing performance. In such a way they (amongst others) expanded some ideas, disputed others and conceived new theories and explanations. In other words the science of educational psychology was developed to guide educational practices and to refer them to an understanding of <u>how</u> people learn and to raise the question of <u>why</u> we teach whatever it is we choose to teach.

Notes

1. Froebel in his recommendations for the school workshop was motivated by the idea that such insitutions would be guided by educational aims. 'The Institution will be fundamental, in as much as in training and instruction will rest on the foundations from which proceed all genuine knowledge and all genuine practical attainments; it will rest on life itself and on creative effort; on the union and interdependence of doing and thinking, representation and knowledge, Art and Science. The Institution will base its work on the pupil's personal efforts in work and expression, making these again the foundation of all genuine knowledge and culture.' (Hailmann, 1887, p.38)
The above quotation was taken from Froebel's announcement of his plans for 'Volkersiehung-sanstalt' - a school workshop project in 1829. The project itself failed but the underlying aims had a direct influence in Finland. It was there in 1866 that Cygnaeus, an admirer of Froebel, introduced Slojd (woodwork) as an obligatory branch of instruction in the schools of his country and as the logical extension of the activity principle. Slojd was introduced to Britain and became popular during the last decade of the nineteenth century, but Froebelians disassociated themselves from it because they saw it as being divorced from the wider conception of education which they themselves attempted to fulfill. (Woodham-Smith, 1951).

2. Van der Eyken and Turner (1969) write of Geddes' argument that it was his belief that learning should be more relevant to the needs of the community. Geddes objected to the emphasis placed upon classical and

academic conventions which directed their schooling. He argued that the 'Three Rs' were traditionally useful to a small elite and that this type of education toward scholarship and aesthetic appreciation was being watered down and offered to the mass population. Consequently the natural acquisition of skills and wisdom was being subordinated to the learning of irrelevant knowledge. To restore balance, he called for an educational programme based upon the Three Hs - Heart, Head and Hand - which would make learning more relevant to the needs and lives of the majority of people.

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Appendix

The Kindergarten Gifts and Occupations, compiled from Kindergarten Guides by Bates (1922) and Kraus-Boelte and Kraus (1888).

Gift I

Box of six woollen balls of $1\frac{1}{2}$" diameter; red, yellow, blue, orange, green, violet. Six strings which correspond with the colours of the balls.

Use

Affords formal introductions to the notions of: colour; material; form; motion; direction; action and reaction. Aids the development of muscular sensibilities, vocabulary and social relationships. Allows simple comparisons of similarity and contrast to be made, therefore perception and discrimination are exercised.

Gift II

Box containing a cube, a cylinder, a ball (each made of hard wood), and a suspending frame. (Bowen (1910) states that in 'Froebel's articles on the gifts and Occupations Gift II also contained a cone of revolution or right cone'.)

Use

Builds upon knowledge and developmental stage of Gift I, progressing from the known - the sphere - to the unkown, symbolised by the cube. It introduces the reconciling means, in this case the cylinder and builds upon knowledge in relation to space, time, form, motion and the relationships between these notions in general.

Gift III

Box containing a 2-inch cube divided once in each direction, forming eight 1-inch cubes.

Use

Presented initially as a 'whole' the cube is a known form, and contained in Gift II. Building upon this previous stage, it introduces the notion of whole as made up of parts. Exercises to emphasise this involve taking the whole cube to pieces, arranging the pieces in some symmetrical way, and then building the complete cube once more. The gift allows construction of representational solid objects and its use builds vocabulary in relation to concrete things.

Gift IV

Box containing a cube, divided into eight solid blocks, 2 inches X 1 inch X $\frac{1}{2}$ inch. The cube is divided vertically into two equal parts, and again three times horizontally into 4 equal parts.

Use

Continues analysis of the cube. Introduces new forms and affords scope for more varied constructional exercises especially in relation to vertical building. Balance or equilibrium and communicated motion are introduced by the exercises afforded by the oblong brick shapes.

Gift V

Box containing a 3-inch cube, divided twice in each direction forming twenty seven 1-inch cubes, three of which are divided diagonally into halves and three others divided twice diagonally into quarters, making thirty nine pieces in all.

Use

Continues analysis of the cube and is a development of the

third gift. Introduces the triangle, and the parallelogram and trapezoid can now be constructed. Allows demonstration through building of geometrical truths, the complexities of which may be explored on many levels from simple to complex.

Gift VI

Box containing a 3-inch cube, divided to form twenty seven oblongs, of which three are divided into halves to form four sided prisms, and six into halves to form square half cubes - thirty six pieces in all.

Use

Continues analysis of the cube, develops further the notions inherent in the 4th Gift, and offers the means for working out small problems as to areas.

Gift VII

Quadrangular and triangular tablets of thin wood or cardboard. Sets may be coloured uniformly with the seven colours of the rainbow, plus black and white, for colour work, or be of plain wood for other types of work.

Use

This gift aims to introduce the idea of surfaces in such a way as to allow a gradual transition from concrete, solid representation to abstract, graphic representation.

The eighth to thirteenth gifts are devices primarily intended to be introductory to drawing and graphic representation.

Gift VIII

This gift consists of a measured length of wood marked in inches and divided into parts of 4-inches each. The parts

are jointed together so that the device folds up.
Use
Demonstrates different kinds of angles. Is a further transition from the plane surface of the tablets to the representation of form and surface by points, lines, and angles. This gift is also used for measuring.

Gift IX

The lathe/slat is a piece of wood 10 inches long, ⅔-inch wide and 1/16-inch thick. It will therefore bend and vibrate, and lends itself to weaving or interlacing.
Use
Provides a material with which an infinite variety of forms can be constructed.

Gift X

This gift consists of small sticks, smooth, rounded, 2 inches long, about as thick as a match, and contained in bundles of at least 10.
Use
Another step in the progression from concrete to abstract is demonstrated by this gift. Representational outlines of various forms can be made, as well as geometrical figures. Stick laying is a direct preparation for drawing and many of the figures laid with the sticks can be copied in pencil. A checquered base upon which to lay the sticks provides guidance for the drawing.

By introducing small wax or cork balls, or soaked peas, the sticks can also be used for constructing the skeleton outline of solids. This enables the child to reconstruct surface and solid synthetically/representationally from the angle point - symbolised by the peas or wax balls.

Gift XI

Circular and semicircular wire rings of various sizes.
Use
Again a preparation for drawing. The rings afford the means of allowing representational outline of the characteristics of the sphere and the cylinder to be drawn.

Gift XII

Thread or thin string, slate, pencil and water. As with sticks and rings this device is concerned with the representational line but it differs in this case since it is not fixed. Also the thread or string affords a medium through which curved or straight lines can be produced. In connection with the play associated with this gift, the scientific ideas of 'capillary attraction' and 'adhesion'can also be discussed; ie, water travels along any hair-like thread, and that wet thread sticks to the slate.

Occupations:
1. Perforating
2. Sewing
3. Drawing
4. Colouring and painting
5. Paper weaving/lacing
6. Mat weaving
7. Paper folding
8. Paper cutting/mounting/stenciling
9. Pea work
10. Cardboard modelling
11. Modelling in clay and sand

The close connections between Gifts and Occupations is demonstrated by the manner in which they are used together. Gift work always precedes Occupation work since ideas must be made conscious (by the Gifts) **before** they can be expressed (through the Occupations). The materials of the Occupations must be such as to come to terms with the student's level of control and yet be capable of extending that control as well as being capable of doing the work in question.

In choosing the Occupation the nature of the Gift exercises which precede must be referred to if the Occupation is to be a practical sequence. Sometimes the observations and impressions referred to by the Gift work are related to solid form, or number, or ideas of plane geometry or sometimes to ideas of beauty. Practical exercises in solid form are therefore afforded by clay and cardboard modelling; use of numbers in groups by mat plaiting; paper folding, paper cutting and paper mosiac go with the tablets for exercises in plane geometry and sometimes to ideas of beauty. Because the occupations relate to the gifts in this versatile way they are not arranged in any definite order or sequence, they are used to develop the ideas which are presented by the Gifts.