

Part II
Instruction

Chapter 10 The Functions of Instructional Education

§ 1. The Principle of Faculty Governance of Instruction

The chapters following this one turn to matters of curricula, subject-matters, instruction, and instructional materials. The institution proposed for these follows from the premise of the functions of public instructional education that were deduced in volume I of *The Idea of Public Education* [Wells (2012a)]. The broad purposes of public instructional education were discussed in that book. As the topic moves into the area of specific details of instructional institution a context for this specification in terms of purposes of instruction must first be made clear and distinct. The context must likewise be connected with the organizational ideas of governance discussed in the previous chapters.

Fulfillment of instructional purposes is tasked to agents of public instruction, *viz.* the teachers and the Principal Teacher. Furthermore, the phenomenon of diminution of common interests, which is the empirical basis for the inverted pyramid structure of education institution discussed in part I, likewise affects specific purposes to be fulfilled by public schools at the divers levels of a schooling inverted pyramid. Stewardship for principles-based determinations of level-dependent specific purposes is placed in the hands of the teachers at these divers levels. For this, design of the *corporate culture* of the teaching agency must be attended to. Prudent respect for history demands that the framework for cultivating this culture in accordance with the principles of a Republic be discussed. That topic, which in practice affects every other aspect of fulfilling instructional purpose, is the first point of discussion in this chapter.

A teacher is a person who, through communication and leader's actions, assists a learner to acquire a learning. This is a task requiring special knowledge and skills for its competent practice. The learner-teacher relationship is the most fundamental relationship in instructional education and so the greatest latitude for teachers' liberty of instruction-determination must be part of the culture of teacher mini-Community in a public school. This determination includes the day-to-day practices employed within the school to fulfill the purposes of the school. Recognition of this gives rise to the ***principle of faculty governance of instruction***. This principle is the school's homologue to the sixth corporate goal stated in chapter 9, i.e., the principle of faculty governance is: ***Maintenance of an organizational environment that fosters individual motivation, initiative and creativity, and a wide latitude of liberty in working toward established goals and objectives.***

Because leadership is one of the root determining factors in making this principle effective, the *leadership role* of the Principal Teacher must be clearly understood. This role is well described by the following five *executive goals for the Principal Teacher*:

1. to effectively stimulate and guide the teachers' leadership dynamic in such a way that the functions of public instructional education are provided by the school;
2. to appoint divers special committees of teachers for administration of various matters of instruction operations; these committees include but are not limited to: curriculum determination; justice administration for teachers and learners; civil Community maintenance between the school and the public (for instance, establishing and participating in a parent-teacher association); scheduling and staffing of classes; evaluation and selection of textbooks and other teaching aids, and such other coordinating committees as seem prudent for accommodating instruction operations to special circumstances in the school's social environment;
3. to provide pastoral guidance for learners and teachers, especially new teachers and learners, as part of the socialization process necessary for assimilating new people

- into the school's culture¹;
4. to preserve, protect, and defend the social contract binding the teachers, learners, parents and other stakeholders in a civil Community;
 5. to ensure all general functions of public instructional education are provided in a form appropriate for the learners by the operations of the school.

Individual teachers have their own Duties connected to fulfilling these five goals. Acceptance of these Duties is a public *obligatio externa* freely given by any person who accepts a teaching position because a public school teacher is always a public servant. It would not be imprudent to dedicate a special committee for cultivating understandings of what the social contract of the school mini-Community is and, when appropriate, providing for such adult education activities as might seem necessary for providing this understanding. The social contract advisor of the school's governing education committee is an *ex officio* counselor and special advisor to the faculty. The purpose of faculty governance is to provide for Enlightened Order and Progress in the instructional operations of the school mini-Community. Its principle utterly forbids Taylorism.

The principle of faculty governance is the antithesis of how the Progressive Education Movement's early 20th century reforms implicitly regarded teachers. There are presuppositions inherent in the PEM's otherwise well-justified campaigns to improve teacher training by establishing colleges of education and by adopting new teaching methods many PEM reformers thought were "scientific" methods [e.g., Bode (1927), chap. XV]. There is no credible argument against the proposition that normal school training for teachers was in need of a great deal of improvement at the start of the 20th century. Making a science of teaching is also proper. But the PEM reforms divided educators into a caste of educologists and castes of instructors. Presuppositions about the instructor-teacher were institutionalized by curricula set up in the divers colleges of education.

What one finds in those curricula is a notable *lack* of any significant part of teacher education dedicated to either persuasive *Personfähigkeit* or to *instruction design by teachers*. Educologists were to decide what was scientific and professional in the practice of teaching. Curricula trained the majority of practicing teachers for a role analogous to that of a production technician in a factory. If engineers were trained the same way teachers are, there would be little new product invention or Progress in the state of the technical arts. *Design skill* aimed at improving teaching practices and instructional systems is curiously omitted by colleges of education to this day – curious because it is an omission that tacitly presumes actual *practitioners* have no need of it. This might be so if all innovation in instruction flowed *from* educologists *to* practicing teachers with an expectation for practitioners to practice by mimesis. But this promotes a static picture of the teaching profession one finds in no branch of the physical-natural sciences. Furthermore, the educologist presupposition is the same as the 'creative minority' presupposition Toynbee found to be a factor in the arrest and breakdown of civilizations. There are many homologues between the practice of engineering and the social-natural practice of teaching, but no college of education recognizes these homologues. (Neither do colleges of engineering recognize homologues between engineering practice and teaching practice). *To the same degree* that an engineer is an applied physicist-mathematician, a teacher is an applied social-natural psychologist-sociologist.

Actual circumstances gainsay the PEM premises. In many school districts teachers spontaneously undertake coordinating and discussion activities aimed at improvement of the services the public school provides its learners. The liberty to self-govern instruction practices is quite limited, true enough, but nonetheless it exists to a degree. The phenomenon demonstrates that both intent to achieve Progress in teaching and practical need for this Progress is recognized as important by

¹ The adjective "pastoral" is used in its connotation of "offering help and caring to others."

the teachers themselves. All by itself this phenomenon contradicts the PEM's educologist-instructor Taylorism. That the real practice of teaching is different from the image of it implicitly presented by college of education curricula is a shock I think most new teachers are likely to experience. A practitioner is severely handicapped when the training provided within the training establishment omits *téchne* needed for developing accommodating practices. The gap that results between theory and practice is one lampooned by Harper Lee [Lee (1960), pp. 17-24, 28-31, 36, 280-283] in such an effectively instructive manner that I recommend it for your consideration.

The PEM premised a Taylorite paradigm of rulership in which an elite caste of educologists was to dictate, down to the levels of individual schools, training and qualifications for teachers, curriculum organization, and a system of learner castes (known as the differentiated curriculum with its associated 'tracking' of pupils). The last was one of the most antisocial actions promoted by the PEM because it is nothing else than a system of institutionalized bigotry in public education [Wells (2013), chap. 15]. There is little room for or tolerance of faculty governance when 'best practices' are to be dictated by an elite caste within the community of educators. But this is precisely how today's teacher training establishment is instituted.

§ 2. Teaching to Private Purposes in Public Education

The citizens of a Republic agree to alienate some portion of their wealth assets in order to establish Institutes of public education because they recognize that by doing so the power of their association is strengthened to the benefit, directly or indirectly, of every citizen. Their general purposes of public instructional education, and the functions of instructional education deduced from them, *justify* the *public* institution of instructional education (PIE) in Republican Society.

However, this justification is ill-served if *private* purposes of the learners are neglected. Neglect of private learner purposes hinders the effectiveness of instruction to a degree so great that the public purposes cannot be adequately fulfilled. This situation is grounded in the mental physics of human nature, which I briefly describe below. The consequence of this dependency of fulfillment of Society's purposes on private learner purposes is that private learner purposes must be regarded as an essential *means* for achieving the public *ends* of public instructional education.

Teachers teach but only learners learn. The purpose of teaching is not merely to assist the learner to learn but also to ensure the learner learns lessons necessary for the possibility of a civil Society to endure and prosper. These are social lessons and among them are lessons of citizenship Duties. All citizenship Duties are reciprocal Duties, i.e., Duties of a person with regard to the situation of other people. But no person will obligate himself to such Duties unless he understands that by doing so he is *at the same time* serving his own Duties-to-Self. This is why private purposes *are justified* as one part of the institution of public instructional education.

This, in turn, raises an important question: *What* is the relationship between private purposes and public purposes in education? I answer this in the next section. This question was not even asked by 19th century American education reformers. PEM reformers in the 20th century did ask it but did not find a correct social-*natural* answer for it. That is not something for which blame can be justly imputed to the PEM. When the PEM reform program was being formulated in the first decades of the 20th century, the reformers were handicapped by lack of scientific knowledge of two sorts. On the one hand, empirical knowledge gained after the invention and subsequent development of childhood developmental psychology was not then known. Dewey's theory did contain generally correct psychological precepts, but these were of a qualitative sort not sufficient for deducing objectively valid teaching methodologies. As a consequence, psychological premises PEM reformers did adopt were romantic rather than enlightened. (Here and elsewhere I use the adjective "romantic" in its connotation of "not practical; visionary or quixotic"). The premises that *could* be made at that time could have been nothing else than judgments of taste

because there was no objectively valid knowledge upon which to base psychological premises.

On the other hand, objectively valid understanding of the *homo noumenal* nature of purposes could not have been obtained prior to the discovery of mental physics in the early 21st century. What I mean by this is that it is necessary to understand how human beings come to *construct* practical purposes in the first place, and this is an understanding only mental physics provides. The largest part of instructional education subsists in persuading learners to *develop* interests and purposes *they do not have* prior to their educating activities. That such persuasion is possible at all is due to how the motivational dynamic in human judgmentation operates [Wells (2009), chap. 10]. In point of fact, Dewey's psychological conjectures regarding the connection between learner purpose and teaching [Dewey (1916), pp. 152-165] are true by and large. The problem was his conjectures are placed at a too-remote conceptual level of abstraction and do not point the way toward *specific* means and methods of teaching. All actions are actions taken in the particular and Dewey's precepts, while true, were not connected to the particular nor did he present particular observations and evidences from which he reached his generalizations. Fecund methods could not be developed without these connections. To recap what he did say in regard to teaching methods:

Method means that arrangement of subject matter which makes it most effective in use. Never is method something outside of the material. . . . Method is not antithetical to subject matter; it is the effective direction of subject matter to desired results. . . . Method in any case is but an effective way of employing some material for some end.

These considerations may be generalized by going back to the conception of experience. Experience as the perception of the connection between something tried and something undergone in consequence is a process. Apart from effort to control the course which the process takes, there is no distinction of subject matter and method. There is simply an activity which includes both what an individual does and what the environment does. [Dewey (1916), pp. 180-181]

One may – and a scientist must – regard what Dewey said here as speculation or hypothesis because of the absence of documentary empirical evidence in his presentation. Nonetheless, if we do regard it as speculation or hypothesis, it would have to be said that it was a prescient speculation because it was confirmed at causative empirical levels by later research carried out by Piaget *et al.* [Piaget (1974)]. Piaget's finding that is most pertinent to the present discussion is:

Considered first from the point of view of the material action . . . the general law that seems to emerge from our findings is that cognizance proceeds from the periphery to the center – these terms being defined as a function of the path of a given behavior. This behavior begins with pursuit of a goal, hence the first of two observable features which can be termed peripheral because they are linked to the triggering of the action and to the point of its application: consciousness of what this goal is – in other words, awareness of the general direction of the action needed to attain it (intention) – and cognizance of its result, either failure or success. More precisely, the periphery is not defined either by the subject [or the object], but by the subject's most immediate and external action when faced with the object: using it for a goal (which, for the observer, amounts to assimilating this object into a previous scheme) and recording the result obtained. These two aspects of the immediate action are conscious in every deliberate activity, while the fact that the scheme that assigns a goal to the action [and] immediately triggers off the means of effecting it (regardless of how appropriate these may be) may remain unconscious, as shown by the multiple situations in this book where the child achieves his goal without knowing how he did so. Thus, cognizance, starting from the periphery (goals and results), moves in the direction of the central regions of the action in order to reach its internal mechanism: recognition of the means employed, reasons for their selection or their modification en route, and the like. [Piaget (1974), pg. 334]

I think it is worthwhile to mention that Piaget recognized this was not an end to explanation. It was merely one new link in the chain of causative explanation. This *disciplined understanding* of basic research characterizes Piaget's entire scientific career. He said in a mid-1970s interview,

Bringuier: I may be mistaken, but the approach you have . . . in a way seems to me to resemble a set of Chinese boxes; the whole of one study, with its result, becomes part of the new field of research.

Piaget: Well, that's our dream. (*Silence.*) They accuse me of . . .

Bringuier: They accuse you of what?

Piaget: The empiricists. Of having a system. They talk all the time of Piaget's "system." I've never had a system. I put successive things together after the fact. I always face the unknown with a new problem and attach the results to those we've already found. Well, of course, that makes a system, but it isn't pre-established with regard to new research. Far from it. [Bringuier (1977), pg. 143]

When Piaget claimed to 'not have a system' what he meant was he allowed no metaphysical pre-suppositions to bias his research. Of course, some metaphysical bias is unavoidable because a metaphysic is 'the way one looks at the world.' But one *can* minimize this. That is the *only* proper procedural paradigm for scientific conduct of basic empirical research [Bacon (1620); Newton (1726), pp. 319-321, 442-443]. I am unhappy to have to say this is a paradigm widely violated² by present day researchers in most fields, including American practices of psychology research². Of America's hundreds of thousands of 'theoretical scientists,' only a handful of them actually are. The rest are doing what they have been taught to do and that is not the same thing. This is part of the high cost of Taylorism we pay in the present American institution of higher education.

Drawing a causal link between the processes of mental physics and empirical observations of what Piaget calls 'mechanisms' in his remarks above is accomplished with more clarity and distinctness when these observations are studied in the behaviors of younger children. This is because a young child's manifold of concepts is much less developed than in older children and adults. Consequently, childish contexts are less complicated and his employment of concepts in the process of judgmentation and in the motivational dynamic does not produce as many individual variations as appear with older people. In order to use the theory of mental physics to greatest effect in the development of teaching methods, the more clearly these linkages are understood the better because the principles of mental physics lie at a broad level of abstraction and, consequently, their immediate application to methods research is faced with the same problem of abstraction that dogged 20th century methodology theory. This is especially true for the issue of learner purposes. It is important to point out that much insight into the nature of learner education activities is gained from studies in the stagewise development of the child's rule practices. Figure 1 repeats the earlier illustration of the empirically identified stagewise development of rules. The detailed discussion of this model is provided in Piaget (1932), pp. 30-42, with a summary given in Wells (2012b), chap. 5. In particular, clarity for understanding basic links between the nature of learner purposes and learner activities is obtained from observations of the motor stage and the egocentric stage of the child's development of the practice of rules (figure 1).

² In some colleges of education students receive some exposure to Piaget's work, but on the whole this exposure is both based on encapsulated interpretations by others and wholly inadequate. It does not get down to the most important 'meat' of Piaget's work, namely his observations. It is not necessary to go get a degree in psychology in order to study and understand his theory; his work stands all on its own. There is no reason whatsoever that students studying to become teachers cannot be taught or cannot learn this theory. In ironic point of fact, it is probably at present better to *not* study American psychology prior to studying Piaget's theory because the former is so heavily infested with idols of metaphysical prejudice.

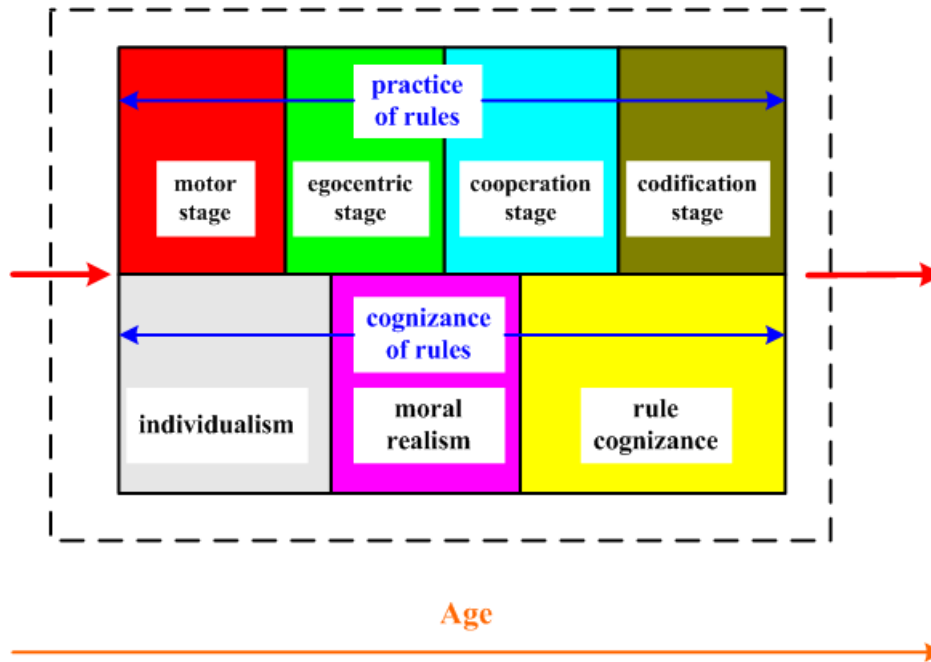


Figure 1: the empirically observed stagewise development of rule practice and rule cognizance in children. The greatest clarity in discovering the linkage between the mental physics of learner purposes and educational activities is found at the motor and egocentric stages of the child's practice of rules.

What can be provisionally deduced from these sorts of observations, viewed in the context of the mental physics of the motivational dynamic [Wells (2009), chap. 10], is the following. Educational Self-development activities are triggered by events which are such that the learner's *observance* of an actual outcome gainsays his *anticipation* of the outcome. This produces the initial disturbance to equilibrium that is required to evoke ratio-expression in the process of appetition with a subsequent reequilibration attempt by means of the judgmentation cycle (figures 5, 6). The motivational dynamic (figure 2) is brought into free play during the reequilibration effort. ***Disagreement between an anticipation and a perceived outcome motivates learning activity.*** However, it is *also* necessary the disturbance be one that cannot be readily negated by type- α compensation behavior (ignorance of detail within perception). Rather, the disturbance must be one that cannot be reequilibrated without type- β compensation behaviors³ being evoked.

In ratio-expression attempts at restoring equilibrium, a human being first evokes type- α rule behaviors because, when they are successful, these provide the most expeditious means to regain equilibrium. Only when these are thwarted (without rupture) do type- β compensations come into play. ***The hypothesis is*** that thwarting of type- α compensation arises from an inability to satisfy disturbance-by-disagreement-between-anticipation-and-perception *because of divers contexts* of anticipatory concepts. What I mean here is that a type- α compensation might compensate a disturbance in *one* context but this compensation *at the same time* produces disagreement with another *contextual* anticipation and thus the overall disturbance state is not re-equilibrated.

If the hypothesis is valid it implies that behaviors indicative of type- β compensation would not be observed until the learner's manifold of concepts is sufficiently enriched by actual experience for his manifold of concepts to contain enough multiple contexts to thwart type- α schemes. There

³ Type- β compensations are compensation behaviors that transform disturbances into variations by forming reciprocal relationships in rule schemes. They produce scheme accommodations, whereas type- α behavior is a compensation of perceptions only. The technicalities I am using here are from Wells (2009).

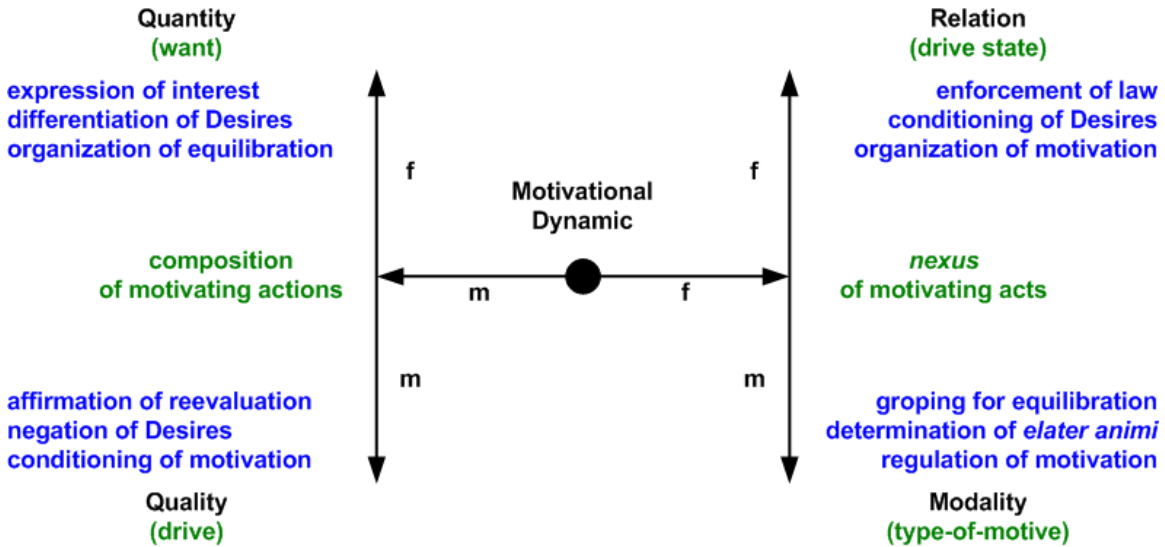


Figure 2: 2LAR structure of the motivational dynamic [Wells (2009), chap. 10].

would, therefore, be a period in mental development when deliberate attempts at constructing schemes of variations are not observed. *This is in fact the case.* The earliest clearly identifiable *intentional* scheme adaptations productive of variations-within-a-scheme-structure does not occur until Stage V of the development of sensorimotor intelligence [Piaget (1952), pp. 263-330]. This stage does not begin until, on the average, around age 11 months with the appearance of what Piaget named the tertiary circular reaction. No external causes for the infant's observed active experimentation behaviors in this stage are observable, which points to disagreements between initial anticipations and observances of actual outcomes as the causative factor.

Once a type-β scheme accommodation has been accomplished, type-α compensation success is made more likely for future disturbances because the compensated scheme is now more general in its applicability. The learner can therefore be expected to revert to type-α compensations, a phenomenon that is actually observed in what Piaget called "rites" of motor rule practice [Piaget (1932), pp. 30-42]. This dynamic is likewise consistent with what I have called the *re-staging* of rule practice that is observable in adults [Wells (2012b), chap. 5, pp. 122-127]. These dynamics of mental physics are extremely important for empirical development of teaching methods as well as for understanding *what sorts of purposes* are fruitfully accessible by means of teaching methods. As a child ages, context growth in his manifold of concepts makes it easier for teaching to appeal to abstract purposes (e.g., future job-interest purposes in studying some course-subject). But for younger children the private purposes teaching method must appeal to are much more practically concrete. Teaching method must match the learner's level of concept development – which is, of course, why the idea of an educational "ladder" with a system of "grade levels" (K through 12) came to be established in U.S. public education [Cubberley (1919), pp. 226-235].

This is a very brief partial description of mental physics in learning. How, though, does all of this relate to the original issue, namely teaching to private purposes in public education?

§ 3. The Perspectival Synthesis of Purposes

I stated earlier that public schools are instituted to serve public purposes but can only do so if at the same time learners' private purposes are also served. When I look at the various arguments most often put forth during disputes over public education, I see people arguing from one of the following general points of view. Some say public education is for the benefit of the public and,

therefore, social purposes are primary. Arguments like these are more or less typical of the Social Reconstructionism Movement of the 1930s through the 1960s. Others argue that education serves private purposes and, therefore, education should be a private, not a public, matter. This sort of argument is often heard from people who describe their political views as neo-conservative. Still others argue that they pay taxes to support public education for the good of their children, that a well educated citizenry is good for everybody, thus serving private purposes is a public good, and therefore private purposes are primary in public education. I most often hear this sort of argument from people who describe their political views as democratic or whose opinions on education could be called neo-essentialist. All these arguments pick either one or the other type of purpose, public vs. private, as primary and logically conclude that therefore the other purpose is secondary.

None of these arguments are correct. The fact of *homo noumenal* nature is that *both* must be *co-primary*; the questions are: (1) is this possible? and (2) if possible, how can it be done? The error contained in all of the above-noted arguments is an error of reification Dewey called 'the isolation of method from subject matter' [Dewey (1916), pg. 183]. He strongly criticized making this division, seeing it as an egregious error in education. Dewey's ontology-centered opinions regarding a psychology of teaching and learning resemble an education principle of Pestalozzi's, *viz.* the one Pestalozzi called the "tenth law" of "the Art of teaching":

The richness of [Nature's] charm and the variety of free play cause the results of physical necessity to bear the impress of freedom and independence. Here, too, the Art must imitate the course of Nature, and by the richness of its charm and the variety of its free play, try to make its results bear the impress of freedom and independence. [Pestalozzi (1820), pg. 202]

Dewey's criticism is consistent with both Piagetian theory and mental physics. Dewey held that it was a cardinal error to divide methods development from the subject-matter being studied. Although his pragmatic psychology was incapable of making *positive* statements regarding method design (because of the level of abstraction in his principles) it *was* capable of making *negative* pronouncements. Four of these are particularly important:

A consideration of some evils in education that flow from the isolation of method from subject matter will make the point more definite. (i) In the first place, there is the neglect . . . of concrete situations of experience. There can be no discovery of a method without cases to be studied. The method is derived from observation of what actually happens, with a view to seeing that it happen better next time. . . .⁴

(ii) In the second place, the notion of methods isolated from subject matter is responsible for the false conception of discipline and interest already noted. When the effective way of managing material is treated as something ready-made apart from material, there are just three possible ways in which to establish a relationship lacking by assumption. One is to utilize excitement, shock of pleasure, tickling the palate. Another is to make the consequences of not attending painful; we may use the menace of harm to motivate concern with the alien subject matter. Or a direct appeal may be made to the person to put forth effort without reason. . . . In practice, however, the latter method is effectual only when instigated by fear of unpleasant results⁵.

(iii) In the third place, the act of learning is made a direct and conscious end in itself. Under normal conditions, learning is a product and reward of occupation with subject

⁴ Dewey followed this sentence with five more making 'positive' speculations that, unfortunately, admit errors of presupposition which led directly to the educologist-instructor caste division in teacher education. These sentences I am omitting from the quotation here to set out Dewey's correct 'negative' statements.

⁵ Just to be sure we are clear about this, Dewey is *denouncing* these methods, which were common in his day and, unfortunately, also common today – a consequence of the lack of a positive part to his thesis.

matter. Children do not set out, consciously, to learn walking or talking. . . . He learns in consequence of his direct activities⁶. . . .

(iv) In the fourth place, under the influence of the conception of the separation of mind and material, method tends to be reduced to a cut and dried routine, to follow mechanically prescribed steps. . . . It is also naively assumed that if the pupils make their statements and explanations in a certain form of "analysis" their mental habits will in time conform. . . . Mechanical rigid woodenness is an inevitable corollary of any theory which separates mind from activity motivated by a purpose. [Dewey (1916), pp. 183-185]

My quotation of Dewey here leaves out other things he also said. I have left these out because they are *not* part of his objectively valid criticism of teaching methods. They are quite reasonable-sounding but nonetheless conjectural 'positive' statements that lack objective validity in human nature. Those assertions – or, more accurately, the ways others understood them – led to particularly serious errors in some of the PEM reforms. One of these was the caste division between educologists and teachers-as-instructors. The specific remark responsible for this was

But in instruction and discipline, there is rarely opportunity for children and youth to have the direct normal experiences from which educators might derive an idea of method or order of best development. Experiences are had under conditions of such constraint that they throw little or no light upon the normal course of an experience to its fruition. "Methods" have then to be authoritatively recommended to teachers instead of being an expression of their own intelligent observations. Under such circumstances, they have a mechanical uniformity, assumed to be alike for all minds. [*ibid.*, pp. 183-184]

In fairness to Dewey I must point out that this statement is ambiguous because it is open to being interpreted as either a negative statement (which would mean Dewey opposes having 'methods being authoritatively recommended to teachers') *or* as a positive statement ('methods *must* be authoritatively recommended to teachers'). Personally, I think he meant this as a negative statement but historically PEM reformers ended up using the positive statement version. One thing appears to be beyond reasonable doubt (because of other things Dewey said during the PEM reformation): Dewey appears to have over-emphasized individual differences among learners and, therefore, as PEM reforms developed they neglected the overarching fact that all human beings are more similar to one another than they are different. The concrete consequence of this over-emphasis is illustrated by one of the factions within the Progressive Education Movement, namely the "child-centered education" faction. These methods roused great public opposition.

The idea that educologists theorizing at a distance from the classroom can reliably discover methods useful to practicing teachers is more-than-a-little arrogant and very unlikely to be true in practice. Institutionalizing this sort of "expert recommendation" from educologist to teacher institutionalizes one of Bacon's famous "idols," namely, the idols of the theater [Bacon (1620), pp. 33-35]. The empirically fecund laboratory where methods-theory research can be carried out with the best likelihood of real success *is* the classroom, and the scientist in the best position to make experimental observations and hypotheses *is* a classroom teacher. Indeed, this is one of the strongest arguments for the principle of faculty governance of instruction because in most circumstances local methods have to be fit to local circumstances. This is because local cultural and socio-economic circumstances affect the learners. Whether she intended to or not, Harper Lee skillfully illustrated this point with vivid imagery:

Miss Caroline began the day by reading us a story about cats. The cats had long con-

⁶ Dewey's third point is the same as what Piaget later demonstrated in Piaget (1974). Dewey's first sentence is saying that while a teacher will make learning a 'direct and conscious end in itself,' the child does not and thus admonitions such as, "You are here to learn" are utterly useless and possibly counterproductive.

versations with one another, they wore cunning little clothes and lived in a warm house beneath a kitchen stove. By the time Mrs. Cat called the drugstore for an order of chocolate malted mice the class was wriggling like a bucketful of catawba worms. Miss Caroline seemed unaware that the ragged, denim-shirted and floursack-skirted first grade, most of whom had chopped cotton and fed hogs from the time they were able to walk, were immune to imaginative literature. Miss Caroline came to the end of the story and said, "Oh, my, wasn't that nice?" [Lee (1960), pg. 18]

Many will argue that a classroom teacher is too busy teaching to have time to do scientific observations or experiments – and that in any case there are serious ethical issues and parental objections to experimenting on children. This is so if one looks to physics for a model of what an "experiment" is. But physics, which is a physical-natural science that has nothing to contribute to social-natural science, does not define what "experiment" *in general* is. Rather, the term has an *epistemological* real-explanation first set out in the mid-19th century by Claude Bernard:

Two things must, therefore, be considered in the experimental method: (1) The art of getting accurate facts by means of rigorous investigation; (2) the art of working them up by means of experimental reasoning, so as to deduce knowledge of the law of phenomena. We said that experimental reasoning deals with two facts at a time: observation, used as a starting point; experiment used as conclusion or control. In reasoning, however, we can distinguish between actual observation and experiment only, as it were, by logical abstraction and because of the position in which they stand.

But outside of experimental reasoning, observation and experiment no longer exist in this abstract sense; there are only concrete facts in each, to be got by precise and rigorous methods of investigation. We shall see, further on, that the investigator himself must be analyzed into observer and experimenter; not according to whether he is active or passive in producing phenomena, but according to whether he acts on them or not to make himself their master. [Bernard (1865), pg. 13]

To experiment is to analyze one fact in regard to another. Now, a teacher assigns, collects, and grades classroom exercises, homework, and tests as an already established part of instructional operations. When an exercise, homework assignment, or test is properly designed, every question or exercise is also designed, and designed in order to probe the question, "Has this learner learned *X*?" The most effective teachers use these kinds of observations to make changes in how they present material, decide whether or not some point needs more repetition, and make other accommodations in how they teach. *Classroom teachers are already engaged in conducting experiments* in the form of the exercises and tests they give and grade. If they also analyze what errors the learners are making and hypothesize on why they are making them *then they are doing experimental reasoning*. What is usually not done is make their findings and hypotheses known to others. Add that step and the result is *experimental research* into teaching method and practice *by classroom teachers in the classroom as a natural byproduct* of what happens there already. The objections cited above concerning classroom experimentation are not objectively valid.

The synthetic union of methods-and-subject-matter is the point where private purposes of the learners and public purposes for the institution of education are brought together and fused into one. To understand this requires one to first understand that in a synthesis between teaching and learning there are always *three* objects-of-purpose involved. From the perspective of the learner there is always some private learner's purpose (which might or might not be directly connected with the topic or lesson being taught). I call this the *purposive object* of teaching-learning interaction. This object generally differs from one learner to another. However, for *every* learner this object is grounded in some *teleological* expedience for the learner and so is an object grounded in the learner's reflective judgment. For that reason it is an object of the judicial Standpoint of Critical metaphysics and is, for the learner, his subjectively sufficient reason to engage a topic.

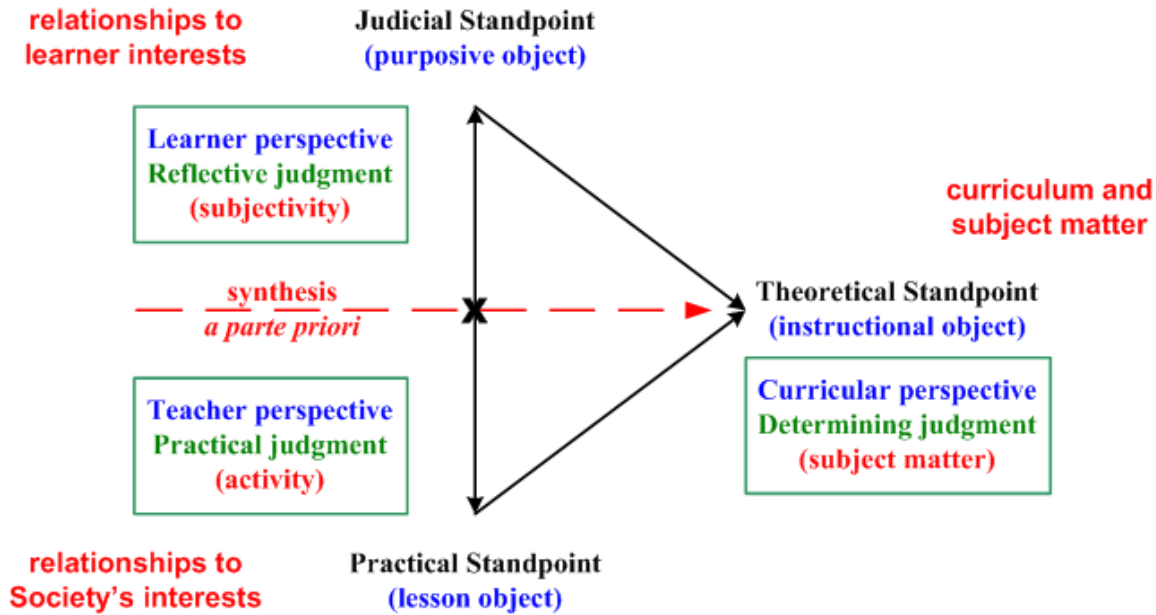


Figure 3: The perspectival synthesis of purpose-objects in teaching-learning interactions.

From the teacher's instructing perspective, which is an action perspective, the direct object of purpose is the object of a particular lesson. All actions are taken in the particular, and everything a teacher expresses during a classroom lesson is aimed directly at some specific *lesson object* that stands as the object of purpose for that lesson. The context of the lesson object is always context in the practical Standpoint of Critical metaphysics.

If the lesson object is not to be the object of a mere whim of the teacher, this object must itself have a connection with a contextual object that stands as the determining factor in the selection and design of the lesson object. Specifically, the object lesson itself *serves an institutional purpose* that provides the real reason why a particular lesson is being taught. This third object-of-purpose is called the *instructional object*. This object is theoretical and conditioned by the social purpose of the institution of public instructional education. It belongs to the theoretical Standpoint of Critical metaphysics because it is conditioned by the applied metaphysic [Wells (2012a)].

The outcome of teaching-learning interaction, therefore, is a goal-directed outcome which is always determined from the synthesis of the learner's purposive object and the teacher's lesson object, *i.e.*, purposive object + lesson object → instructional object. The synthesis is a synthesis of Standpoints [Wells (2012c)]. Figure 3 illustrates this synthesis. This formula of synthesis is called a synthesis *a parte priori*. It is a synthesis antecedent learners' acquisitions of experience.

Instruction design is design in service of those public purposes which justify the institution of public instructional education. Therefore the designs of curricula, subject matter content, and teaching method are all designs justified only by the goal of fulfilling those public purposes. This is what all objectives of instruction design must be based upon if these objectives are justifiable under the social contract of a Society, and so figure 3 represents instruction design from a design perspective. The objective purposes of public instructional education are represented by *none other than the twenty-four functions of public instructional education* previously deduced in volume I of *The Idea of Public Education* [Wells (2012a)].

While figure 3 illustrates the instruction design perspective, concrete designs for curricula, subject-matters, and lessons proceed according to a different formula, namely, instructional object + purposive object → lesson object. This formula synthesizes the unity of the theoretical and the

judicial Standpoints to produce an object in the practical Standpoint and is called a synthesis of coordination [Wells (2012c)]. What gets coordinated in this synthesis are public purposes of education (grounded in the Society's social contract) and private learner purposes (grounded in each learner's personal obligations-to-himself). The *means* for uniting these are the lesson objects actually taught by the teachers.

The perspectival synthesis changes once more during actual instruction. In this case, teachers' actions: *i*) synthesize instructional object with lesson object with the aim of cultivating in the learners an *intended* purposive object; and *ii*) guide the learners' educational Self-development activities (which produce learners' understandings of this object). The fundamental error of child-centered education, as this appeared in the PEM reforms, was that the reformers did not aim to actively guide and produce a purposive object in the learner. Instead, it was presumed that the learner always had some predetermined purposive object supposed to be the product of his experience built up prior to his school and lesson experience. The reformers assumed, largely no doubt from how they understood Dewey's postulates of interest and experience in the psychology of the learner, that the purposive object was fixed. Teaching method and subject matter were, they held, to be adapted to suit this purpose. This is quite wrong. Public instructional education is intended to build future citizens who will be associates and allies in the Society. The PEM supposition, in contrast, could have no other effect than to reinforce individualism in a way that inclines a learner to remain an outlaw living outside the social contract. The effect of such instruction is, with high likelihood, a non-socialized education. Instruction activities are properly to be viewed as synthesizing activities *a parte posteriori* of the form instructional object + lesson object → purposive object. This means *instructional activities are aimed at producing desired purposive objects in the learner* by means of exercises that evoke judgmentation in the learner.

These Critical and social-natural conclusions present a new and very different way in which the social-nature and roles of purposes must be viewed in public instructional education. In this we have a three-fold synthesis of Standpoints, the desired effect of which is to produce *unity of purpose between the private learner, the public, and the public's education institution*. It is an epistemology-centered rather than an ontology-centered way of viewing public education.

This completes, for the purposes of this treatise, the presentation of the *contextual significance* of the functions of instructional education. What remains for this chapter is to review those twenty-four functions. In the next chapter discussion of psycho-social considerations pertinent to teacher-learner interaction and grounded in the nature of its social atoms (human beings) begins.

§ 4. Review of the Functionals of Public Instructional Education

To be strict in the terminology, the twenty-four functions of public instructional education are mathematical *functionals* rather than simple functions. A functional is basically a set of functions belonging to the same mathematical *family* of functions. I bring this up for two reasons. First, each functional denotes a *set* of educational objective functions and not just a single thing that is to be applied repetitiously in every course or class without regard to the topic of that course or class. The functionals set *broad* goals for understanding class- or course-specific functions as *sub-goals* in the context of an HP-MBO instruction management scheme. The latter have to be developed and objectified for each class or course that a particular school puts into its curriculum. Second, not every functional necessarily needs to be made a part of every course or class in the curriculum. As many of the functionals as are pertinent to the topic should be designed into a course or class, but some functionals might not be pertinent to a given topic. What *is* necessary is that *every* functional be covered at each class level somewhere in the required *curriculum*.

Figure 4 illustrates the 3LAR structure of these functionals deduced from the applied metaphysics of public instructional education in *Education and Society* [Wells (2012a)] in chapters 6-9.

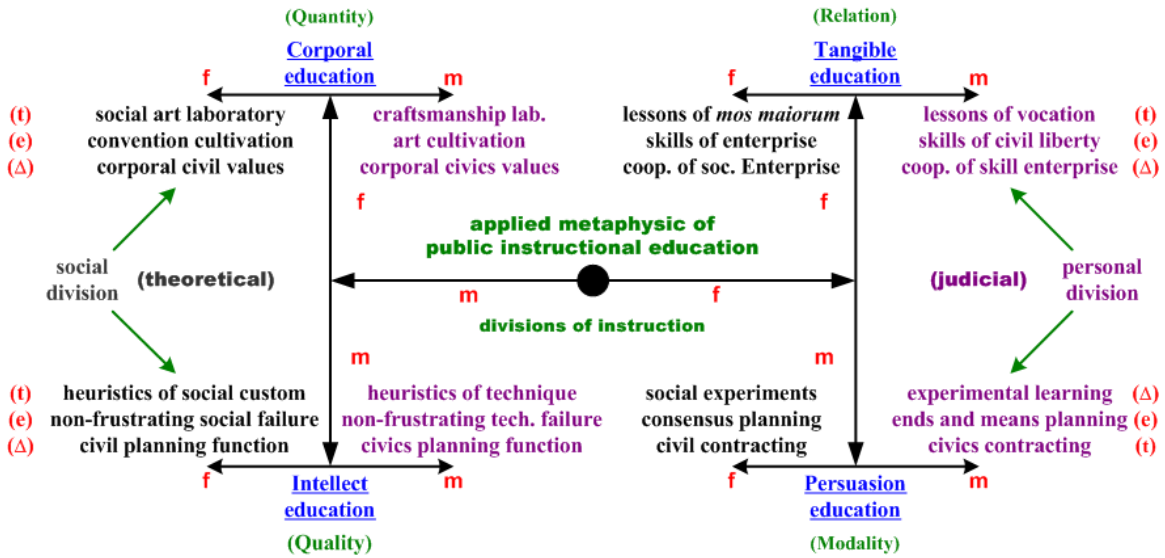


Figure 4: 3LAR structure of the twenty-four functionals of public instructional education.

It is, I trust, obvious that these functionals will be treated here only at a summary level. Volume 1 of *The Idea of Public Education* has to be consulted for in-depth explanation of each functional.

§ 4.1 The Functionals of Corporal Education

As discussed earlier, all objective awareness with understanding (cognizance) starts, as Piaget put it, "at the periphery" (goals and results) and proceeds "to the center" (conceptualization and understanding). All real meanings are *at root* practical, and this means that before a person can conceptualize and understand an object he must have previously formed one or more practical schemes, in his manifold of rules, into which the object can be assimilated. Objects are aliments of action. The schemes into which an object can be assimilated are the root *meaning implications* for the object. As a simple example, to a baby a rattle is something that can be shaken, something that can be sucked, something that can be thrown, etc. The empirical nature and a formal logic of meaning implications is presented in more detail by Piaget & Garcia (1987).

Practical schemes are unconscious. Cognizance refers to conceptualizing a scheme objectively in the manifold of concepts and forming contexts that are linked (via teleological reflective judgment) to that scheme. This linkage establishes the root meanings of the concept. Corporal education is education for cultivating practical schemes *upon which all other types of learning foundationally depend*. Critical epistemology teaches that practical action schemes precede objective understanding. Piaget (1974) empirically confirmed this. This is a Critical underpinning for all instructional maxims of "active learning" and "learning by doing." It is also the key to all developments of learner interests vested in a topic and all learner enthusiasms for learning.

The specifying concept that sets the general context for the functions of corporal education is the concept of *scheme-building* [Wells (2012a), chap. 6]. The principle of scheme-building is the principle of corporal *Personfähigkeit* cultivation: *Learning by doing is necessary for the possibility of learning in general*. "Doing" is a quite broad term, however. When you just sit and listen to someone you are "doing" something; this "doing" does not necessarily involve learning anything. If you immediately assimilate what is being said to you, you haven't learned anything because you have made no changes in either your manifold of rules or your manifold of concepts. Put another way, your cycle of judgmentation has not been evoked and you are merely engaged in ordinary acts of apprehension and perception that *maintain* continuity in equilibrium.

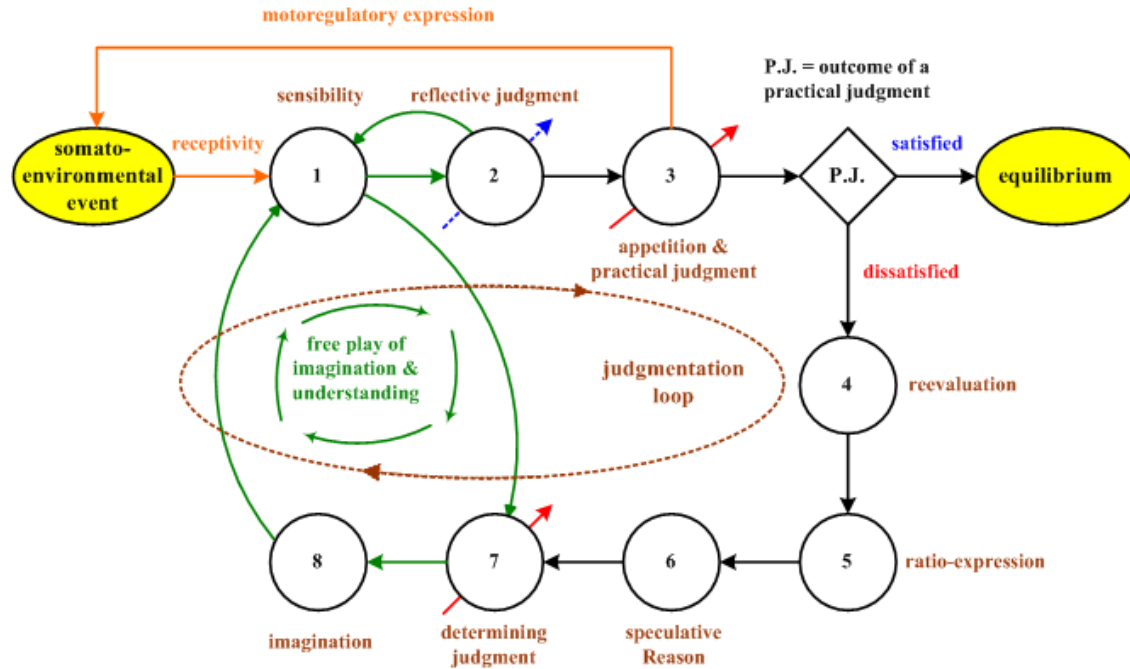


Figure 5: Synthesis in the motivational dynamic of judgmentation. P.J. = outcome of practical judgment. The 'dial' arrows in 2,3, and 7 denote accommodations in the manifolds of Desires, rules, and concepts.

'Doing' in the contexts of scheme-building and learning means engaging the full capacities of apprehension, reflective judgment, appetition and practical judgment, ratio-expression, and determining judgment. It is, in other words, evocation of a synthesis in the motivational dynamic of human reasoning [Wells (2009), chap. 10]. Figure 5 illustrates the logical flow of information and representation in the motivational dynamic. Loss of equilibrium implicates its evocation and so the type of 'doing' I am talking about necessarily involves a re-equilibration.

But even this is not enough because one thing you can "do" with the motivational dynamic is express type- α compensation behavior: you can *ignore* what you're listening to. Think about Harper Lee's first grade class "wriggling like a bucket of catawba worms." Ask yourself this question: Do you remember what Mrs. Cat ordered from the drugstore? If not, you yourself engaged type- α compensation when you read the quote. *All human beings are satisficing problem solvers*, type- α compensation is the most expeditious compensation tactic for achieving a state of satisfaction *whenever type- α compensation is possible*, and the process of practical Reason "cares" only about one thing: restoring equilibrium. It knows no objects, feels no feelings, and "cares" not one whit about "truth." Piaget hit the mark very close to the bull's-eye when he wrote,

[Thought] puts itself at the service of the immediate satisfaction of desire long before forcing itself to search for truth. . . . Even when thought turns away from immediate satisfaction and play, and gives itself up to disinterested curiosity in things for their own sakes (and this curiosity appears very soon, certainly from the age of 3) the individual still has the peculiar capacity for immediate belief in his own ideas. [Piaget (1928), pg. 202]

Whenever I was teaching, I always kept one eye on my students looking for symptoms of type- α compensation. When I saw it, I would divert my lecture just enough to *provoke* in that student some disturbance to the equilibrium his compensation behavior was seeking to establish. Often just mentioning his name would do the trick. Other times I might say something like, "Now, John here doesn't believe this. He thinks such-and-such. But this isn't correct because what happens is . . ." – just a momentary nudge sufficient to rupture the equilibrium cycle 'John' is

trying to settle into, then back to the topic at hand. I'd wave in his direction when I'd say it to get most of the class to turn and look at him – which usually evoked self-consciousness expressions from him. Now, 'John' really hadn't thought any such thing as what I'd just 'put in his mouth' – I just made that up – so he'd not only been momentarily singled out but falsely accused to boot. He'd start paying vigilant attention, nervous about what other embarrassments I might put him to. He's never given a chance to defend himself because I *immediately* make things 'move past' *him*. Make sure the nudge is *never* vicious; its only purpose is to get 'John' to *engage* with the topic⁷.

'Doing' in the context of the principle therefore means undertaking some activity by which the learner makes an accommodation either in his manifold of concepts or in his practical manifold of rules. The functions of corporal education are aimed at the latter. Using 'John' as a continuing example, what I did is aimed at introducing a disturbance leading to some *type-β* accommodation in whatever practical scheme in his manifold of rules is responsible for his expression of type- α compensation behavior. Mathematically, what I aim for is to link the accommodation to an obligation-to-Self with respect to personality – specifically, his Self-obligation to not-embarrass himself in front of his peers. 'John' might or might not let his attention wander in other teachers' classes, but it usually wasn't long before he no longer did it in mine.⁸ This example illustrates what I meant earlier by the qualification "when type- α compensation is *possible*." My goal as a teacher is to *make* that type- α compensation *impossible* for a student to effect. Learning by doing takes in mental judgmentation schemes of ratio-expression just as much as physical schemes of motoregulatory expression. (Note the loops for each in figure 5).

There are six functionals of corporal education: three in the personal dimension of the learner-as-a-free-person and three in the social dimension of the learner-as-a-member-of-a-Community. Under this logical division, the specifying concept of scheme building specializes to

- SC(1): personal skill scheme-building in the context of learner-as-a-free-person;
- SC(2): social skill scheme-building in the context of learner-as-member-of-a-Community.

Skill is the *ability* to practice a craft and a craft is the *practice* of some special art. Picking on 'John' some more, educational Self-development is a personal craft; it doesn't do much good to *tell* a learner to "make a habit of practicing life-long learning" but a good teacher can *manipulate* a learner into *developing* a habit of practicing it. A significant fraction of teaching is aimed at guiding beneficial habit-development and beneficial habit-cultivation in the learner.

4.1.1 The first pair of corporal education functions are called the craftsmanship laboratory and the social art laboratory. The former belongs to the personal dimension, the latter to the social dimension of the learner. Craftsmanship laboratory skills are of a task or problem oriented nature and pertain to the learner's ability to successfully carry them out when working with dead-matter

⁷ This kind of corporal lesson targets high level obligations-to-Self in the manifold of rules. Never *dwell* on the disturbance you're producing with this tactic because you'll focus him on *you*, not on the compensation behavior you're trying to get him to change. Nothing beneficial ever comes from that. Make the nudge a momentary little push then get yourself back *out* of his groping to re-equilibrate and carry on as if you'd never really noticed him. The lesson *is* personal but you want to allow him to *feel* that it is not. If he does protest his innocence (a first step toward defending himself), respond with a friendly "Ah!" and nod then move on with the topic. You've already accomplished your purpose; his type- α compensation is ruptured.

⁸ I had a reinforcing reward for 'John' when I saw this was accomplished. In some subsequent lecture, I'd divert it just enough to put in, "Now, John here thinks this-and-that *and he's absolutely correct!*" Again, it didn't matter whether or not 'John' was really thinking this. Corporal functions are *subjective*, not *objective*. It takes a bit of practice and self-discipline to keep track of what corporal lessons you've got going on with different students, but it can be done and it gets easier the more you practice it. This is part of *real* human-natural "learner-centered education."

objects⁹. The function pertains to developing the learner's schemes of sensorimotor skills for mastering crafts and occupations. The **craftsmanship laboratory function** is a curriculum of physical exercises that are designed to teach the learner how to employ the physical capacities of his body in building sensorimotor schemes by which he can master any craft involving divers kinds of dead-matter objects he can be reasonably anticipated to encounter in life.

The social function deals with interpersonal skills, again in regard to sensorimotor schemes. The **social art laboratory function** is a curriculum of physical exercises that are designed to teach the learner how to employ the physical capacities of his body in building sensorimotor schemes by which he can master interpersonal relationship skills involving his ability to accommodate his social intercourse expressions to divers mini-Communities and assimilate the normal habitual social intercourse expressions of divers mini-Communities he can be reasonably anticipated to encounter in life.

4.1.2 The second pair of corporal functions is comprised of the art cultivation function in the personal dimension of the learner and the convention cultivation function in the social dimension of the learner. *Cultivation* is study, care, and practice directed at improving or advancing something. In a broad sense of the word, all education is human cultivation. To use a simile, education is like agriculture and not like manufacturing. The farmer does not "grow the corn"; the corn grows itself. Similarly, a teacher does not "learn his pupil some math"; the pupil does that himself. All that a farmer or a teacher can do is "tend the field" and provide for conditions under which the cultivated produce will thrive. Kant wrote,

The positive part of physical education is *cultivation*. In this respect the human being differs from the animal. [Human cultivation] subsists above all in the exercise of his mental powers. Therefore, parents must give their children opportunity for it. The first and foremost rule is that one must do without all tools as much as possible. . . . That is to say tools only ruin natural proficiency. . . . It comes to merely cultivating natural aptitude. Often it takes informative instruction, often the child itself is inventive enough or it invents instruments itself. What should be adhered to in physical education, that is in view of the body, relates either to the use of voluntary movements or to organs of sense. What comes first with the former is that the child should always help itself. That takes strength, dexterity, agility, and certainty. [Kant (1803), 9: 466-467]

The **art cultivation function** is comprised of *designed corporal activities aimed to develop the learner's abilities to accomplish things in terms of schemes of how-it-can-be-done*. There is a tie between sensorimotor scheme cultivation and *the learner's ability to conceive possibilities* for things he has never before observed and for doing things he has never before done. Piaget found,

[The] young subject does not begin by considering reality only, constituted by pure observables, and later complete this by constructing possibilities and necessary relations. Rather, the ontological status of the initial state is one of nondifferentiation: reality as perceived or manipulated appears as being necessary as it is so that it constitutes the only possibility, except for occasional variations that are accepted as realizable because they have already been observed and are, therefore, part of a particular sector of the same non-differentiated reality. . . . [Piaget (1981), pg. 148]

⁹ A dead matter object is an object regarded as a thing to which the Kantian definitions of 'life' and 'organized being' cannot be applied. Every object studied in the physical-natural sciences (physics, chemistry, biology and sciences derived from them) is a dead matter object. For instance, when a biologist studies a cell he is not studying life but, rather, a physico-chemical entity for which cause and effect are understood in terms of physical causality and dependency. Live matter objects (human beings) are objects for which cause and effect are understood in terms of psychological (teleological) causality and dependency. This distinction is a theorem required by epistemology-centered Critical metaphysics.

In fact, from the sensorimotor level on, one can distinguish four processes: (1) assimilations that function in the immediate present and lead to success; (2) accommodations that are similarly direct; (3) positive (obstacles) and negative disturbances (gaps and limitations) inhibiting (1) and (2) or opposing their realization; and (4) compensations that neutralize (3) and bring about new accommodations that become possible through a differentiation at (2) and that constitute, thus, the beginning of a procedure. [*ibid.*, pg. 151]

In very young children possibilities are bound up with that childish cognizance of rules called *moral realism* (figure 1). "Justice" and "what is right" are not separate concepts to a young child. Furthermore, as Piaget documented in earlier studies [Piaget (1930)], a young child's earliest explanations even of physical events are "moral" rather than physical explanations, which implies that he even views observed physical phenomena with the same or a similar factor of moral realism at work in his cognizance of them. As the child ages, his regard for the "moral nature" of rules is greatly moderated, but moral realism is never wholly eradicated even in adults. It is, indeed, an observable feature in the re-staging of moral judgments by adults. It is no accident of language that notions of "right vs. wrong" permeate ethics theories and define them to nearly the same degree as do notions of "good vs. evil." What is hardly appreciated at all is that such notions as "the right way to do things" carry this same mark of moral realism and that this goes so far as to limit adult conceptualization of possibilities, as when it is said of someone, "he can't think outside the box." Metaphorically, scheme-sets define a person's "box" [*cf.*, Adams (1979)].

Because cognizance "proceeds from the periphery to the center," sensorimotor schemes are an essential part of all other learning. Corporal education is that part of public instructional education that has for its object the cultivation of schemes. Implementation design of the art cultivation function must *exploit* the phenomenon of moral realism as this relates to the learner's ability to conceptualize possibilities and, later, necessities. A social-natural practice of instruction contains designed physical exercises that exploit the phenomenon of moral realism in such a way that *with* his acquisition of physical skills the learner also develops a *desired* "sense of justice" insofar as how he exercises his skills affects his Society. ***Ceremonies and rituals promote this.*** The learner is going to develop a "sense of justice" in any case and is going to apply this to everything he does regardless of whether or not formal education is proactive in shaping how this "sense of justice" develops. It is incumbent upon *public* education to cultivate it along lines beneficial not only to his own economic welfare enterprises but to the Community of his Society as well.

The art cultivation function is aimed at arts for which the learner develops skills he will need in order to attend to his personal welfare in life. The convention cultivation function does so in regard to the skills he will need to harmoniously fit in and interact with others in his Society. The ***convention cultivation function*** is comprised of *designed group corporal activities aimed at developing notions of behavioral conventions in terms of sensorimotor schemes expressive of these notions.* The art cultivation function is individual and personal. The convention cultivation function is implemented in group settings because the practical rules it aims to develop concern the interactions among diverse individuals. It pertains to practical maxims of teamwork and social integration. Social-natural practice of instruction contains designed physical exercises that exploit the phenomenon of moral realism in such a way that the learner acquires desired schemes that express behavioral conventions for the exercise of his liberties of action in carrying out his personal enterprises. The function aims at shaping and cultivating a desired *social character* in the learner. Social character is what marks the difference between a Father Flanagan and a Fagin.

4.1.3 The last pair of corporal education functions is comprised of the corporal civics values function in the personal dimension of the learner and the corporal civil values function in his dimension of learner-as-a-member-of-Society. In the context of scheme-building, these functions pertain to Self-determinations of actions that are grounded in what deontological ethics theory calls *obligatio externa* (outward pledging). This is a form of pledging in which the pledge is made

to another person or group of persons (the pledgee). *Obligatio externa* is a disjunctive form of *obligatio*, which means that the pledger regards his Obligation as being co-determined with a reciprocal Obligation pledged to him by the pledgee [Wells (2012b), chap. 10]. There are two contexts that subsist in his Obligation: (1) a context of an Obligation he pledges to another; and (2) a context of an Obligation the other pledges to him. The first pertains to civics education, the second to corporal civil values education.

Unlike Obligations-to-Self, which form out of the natural dynamic of judgmentation according to the formula of the categorical imperative of pure practical Reason, a human being has no innate or *a priori* social instinct to develop tenets of *obligatio externa*. The individual must *learn* to make meaning implications that refer to a structure of *obligatio externa* in his practical manifold of rules. The value axiom states that the goal of corporal social education is to ensure that he *does* develop this practical structure within his practical manifold of rules.

The corporal *civics values function* consists of *a suite of designed corporal exercises made to include exercises in scheme-building that produce a value structure within the learner according to which he becomes willing to pledge himself to Duties to others in regard to their situations*. The adjective "civic" means applying or pertaining to the conduct or behavior of an individual in his social interactions. Value structure is the practical manifold of rules as a system of self-organizing transformations in relationship to which values constitute conditions for the assertion of practical rules. Civics values exercises in this function pertain to the learner's self-determination of how he is to behave and conduct himself in interactions with other people.

The corporal *civil values function* consists of *a suite of designed corporal exercises made to include exercises in scheme-building that produce a value structure within the learner according to which his expectations of civil Obligations is congruent with the social contract of his Society*. This differs from the civics value function in the following way. The civics values function goes to what the Society expects of its members; the civil values function goes to what members expect from their Society. As a citizen I accept a Duty to oppose injustice inflicted on any fellow citizen *by* our Society, to oppose any tyranny of a majority over a minority, to oppose all *unjust* laws, etc. The deontological principle here is the same as that which grounds a Duty of patriotism that was stated by Charles Eliot Norton in protest of the Spanish-American war:

The voice of protest, of warning, of appeal is never more needed than when the clamor of fife and drum, echoed by the press and too often by the pulpit, is bidding all men fall in and keep step and obey in silence the tyrannous word of command. Then, more than ever, it is the duty of the good citizen not to be silent. [Norton (1898)]

The civil values function goes directly to the fundamental condition of the social compact. The civics value function, by contrast, goes directly to the term of the social compact, i.e., that each citizen put himself and all his power in common with his fellow citizens under the supreme direction of the general will of his Society.

The discussion of the corporal education functions just concluded persistently involved ideas of social conventions and the Society's mores and folkways. One thing I again stress is *it is not within the granted authority of any teacher or agent of public education to determine what these conventions, mores, and folkways are to be*. That faction of the original PEM who later became the Social Reconstructionist Movement presumed to take this determination into their own hands. By doing so, without the agreement of the citizen body politic, these reformers instituted grave enormities abridging the civil liberties of many American citizens and giving rise to further uncivic divisions between privileged and underprivileged classes. The agents of public education are public servants. It is not given to them to re-make the Society they accept a Duty to serve. This statement applies to every aspect of public instructional education.

§ 4.2 The Functionals of Intellect Education

Intellectual power is the power of a person subsisting in his capacities of knowledge, intelligence, and judgment. It does not pertain to what a person knows but, rather, what he can *do* with what he knows. Intellect education is education cultivating this aspect of *Personfähigkeit*.

The specifying concept for intellect education is *intelligence-building*. Intelligence-building means *the constructing of mental schemes for how to effectively adapt knowledge to uses*. Unlike the scheme building objective of corporal education, that of intellect education pertains to ratio-expression, i.e., the employment of determining judgment and imagination in the construction of new concepts and the establishing of new meaning implications for concepts.

In non-technical discourse people use words like "idea," "concept," "judgment," and the like without difficulty and usually without much ambiguity in communicating their meanings to one another. Philosophers, on the other hand, are aware of the metaphysical haze that engulfs arguments over what any of these terms ought to properly mean. Engineers, mathematicians, and computer scientists engaged in "artificial intelligence" or "computational intelligence" work soon run headlong into these very deep metaphysical weeds that philosophers know so well. If, after all, you want to build a machine and claim it has "artificial intelligence," do you not need to know what "intelligence" is? If you did build "a machine that thinks," how would you know it? Is an "idea" always "knowledge"? If someone tells you Kennedy was assassinated by a Martian, does that person have "an idea" or just a "crackpot idea," and what is the difference between the two of these? In typical non-technical discourse, "idea," "concept," "judgment," "purpose," and other terms are often used synonymously and people understand each other through the *context* of whatever it is they are discussing. Webster's Dictionary treats us to the following usages:

concept: an idea, especially a generalized idea of a class of objects; a thought; a general notion.

idea:

1. a thought, mental conception; mental image; notion.
2. an opinion or belief;
3. a plan; scheme; project; intention; aim; design.
4. a hazy perception; vague impression; fanciful notion; fancy; inkling.

These are vulgar usages, not technical explanations. Adler and Gorman wrote,

Does the word "idea," when it is used in the technical discourse of metaphysics or psychology, signify that which is known or understood? Does it signify, not the object of thought, but the thought itself? Or both? Certainly in popular speech the word is used both ways, for men speak of understanding an idea and note differences in the understanding of the same idea; and they also say that they have different ideas about the same thing, meaning that they understand the same thing differently.

The word "idea" has many other oppositions of meaning in its tremendous range of ambiguity. . . . Sometimes "idea" means a sensation or a perception as well as an abstract thought, and then its connotation extends to almost every type of mental content; sometimes it is denied that there are any abstract or general ideas; and sometimes "idea" has the extremely restricted meaning of an image which is the memory of a sense-impression. [Adler & Gorman (1952), vol. I, chap. 37, pg. 761]

If one intends to educate another or to have another "get educated," and, especially, if one is so bold as to speak of "intellect education," it seems not-unreasonable that it would be good to know what one is talking about. The ambiguous and semantically-overlapping words we use to

try to describe what it is that a teacher seeks to impart to a learner get that ambiguity courtesy of divers ontology-centered metaphysical premises. Critical epistemology tells us that if we want real explanations and real definitions, we must seek these at their practical roots. All these words, when we use them, are used to try to intelligibly describe some thing, some mental phenomenon, that has actually happened either to ourselves or to others.

What does a "concept" or an "idea" *do* for or to the human being said to "have" it? When this question is looked at mathematically in terms of mental physics, the answer is that thinking alters the presentations that the process of reflective judgment declares to be expedient for the categorical imperative of pure practical Reason (the imperative of equilibrium). The presentations of this *subjective* process of judgment likewise present impetuous energetics of motoregulatory emotivity, which the process of appetition in practical Reason either permits to be expressed or else vetoes. *Motivation* is accommodation of perception and *motoregulatory expression* is its assimilation. Thus, those capabilities that we call "intellectual" or say "reflect the intellect" have their root meanings vested in the reasoning dynamics of the judgmentation loop (figure 6).

The process of Reason is the master regulator of all non-autonomic human activity. This regulation extends, by means of ratio-expression, to the regulating of thinking, apprehension, and apperception every bit as much as to regulation of motoregulatory expression. These regulations are, like all others legislated in pure Reason by practical judgment, structured and honed in the manifold of rules. Intelligence-building pertains immediately to practical schemes in this manifold by which appetition determines ratio-expression. Like corporal education, intellect education has for its object the guided development of rule structure in this practical manifold. The functions of intellect education are functionals pertaining to this guidance. Subject-matter in education is but a tool for doing this guiding through the only portal open to a teacher, namely receptivity for the processes of apprehension and apperception in human sensibility.

The six functionals of intellect education all aim at effecting adaptations in the practical manifold of rules by which the learner makes himself better able to respond to and deal with situations he encounters in his interactions with the world he lives in. This ability is the essence of what we mean by *intellect* – not what one *knows* but what one can *do* with what he knows.

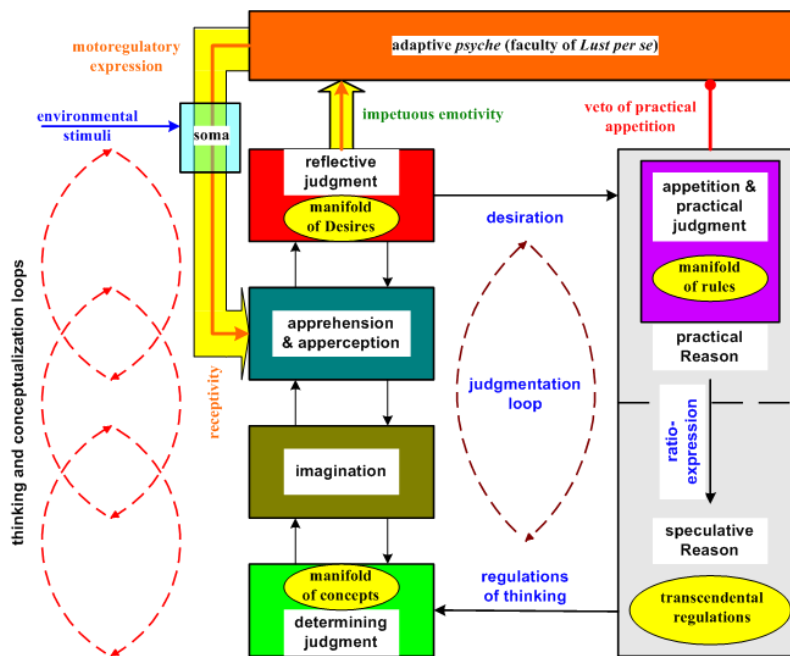


Figure 6: Structural "mathematical anatomy" of mental processes in the phenomenon of mind.

Reasoning is the Self-regulation process of the general process of judgmentation. The way in which this Self-regulation is effected is by means of *schemes of reasoning* in the manifold of rules. The teaching focus in intellect education is teaching the learner *how to construct schemes-of-reasoning schemes*. Indeed, this sort of teaching is at the root of what is meant by the phrase "teaching skills of critical reasoning."

4.2.1 The first pair of functionals for intellect education is comprised of the heuristics of technique function (personal dimension of the learner) and the heuristics of social customs function (social dimension of the learner). The ***heuristics of technique function*** is *provision in the curriculum of exercises through which the learner practices developing his ability to construct heuristic procedures applied to dead-matter objects*. This means the learner must be presented with concrete dead-matter problems, puzzles, situations, etc., new in character to his prior experience, that require him to grope and experiment in order solve the problem, work the puzzle, resolve the situation, etc. He *must not* be told *how* to solve the problem, work the puzzle, etc.; in other words, he must not be *given a technique*. He must instead be set to the task of *developing a technique* in the absence of *a priori* knowledge of how he can attain the objective. He can be given hints, shown examples from familiar problems, and be guided and coached as he gropes for a solution. But he must not be *told* how to do it. The objective is for him to adapt his knowledge in such a way that he can use his knowledge to figure out how to confront new situations and challenges. A ***heuristic*** is *any directed procedure for discovery, problem-solving, invention, or creative formulation that functions by reducing the range of possible solutions to a problem or answers to a question*. The desired outcome of the functional lesson is a heuristic.

The function for the social dimension is similar but applied to live-matter objects (people in social situations). The ***heuristics of social custom function*** is *provision in the curriculum of exercises through which the learner practices developing his ability to construct heuristic social procedures applied to live-matter objects*. Again, the learner must not be given a procedure; the goal of the lesson is for him to develop rule schemes for *finding* a procedure.

There are, of course, very great challenges that face finding lessons to teach this to very young children, whose thinking and logic is still almost completely dominated by childish egocentrism (figure 1). One suggestion is to begin by setting up situations in which older children show younger ones how to play selected games. Piaget found that at first very young children will play egocentrically, i.e., will play without regard to "winning" [Piaget (1932), pp. 88-96]. Social custom schemes should not be expected to result from the exercises at this stage. However, just the *introduction* of social factors begins to build concepts of context in the child's manifold of concepts that will later be key to acts of accommodations that *do* produce new social schemes, setting up the possibility of heuristic scheme development. Children like to play and lessons like this can be thought of as a sort of "guided recess period" in which the older and younger children both are receiving lessons of social custom, albeit different lessons for different age groups. It is worthwhile in this context to remember that there was once a time when "games" were a regular part of the school day with teachers *taking part* in the children's games. Retired teacher Tresa Bickford (1907-2003), a respected rural Iowa teacher from 1932 to 1972, recalled in an interview,

If a teacher went to the playground with the pupils and took part in the games, discipline was not much of a problem. Games were seasonal. In the fall, especially in the twenties and thirties, it was softball in training for the tournament. First place winners were given a trophy . . . Other games commonly played in all the schools were: Grey Wooley, Drop the Handkerchief, Pom-Pom Pullaway, Lose Your Supper, and Anteover (played with a ball thrown over the wood shed or, sometimes, even in the school house).

In winter a lot of indoor games were used. Some were blackboard games like One Old Cat, Tic Tac Toe, Ciphering Down (which was good arithmetic drill) and Spell Downs or Bees. After a snowfall there was sledding, Fox and Geese, and a game called Angels in the

Snow. Then in spring there were marbles, jumping rope, and training for track events, which was another fun day for all the schools. Blue, red, and white ribbons were given for winners in these events. All schools in the county participated, even the teachers took part in some of the events.

If the school was small, the teacher had to use a lot of ingenuity to keep the pupils happy. I taught in one school where we had seven pupils, not enough for an organized game. The school house was stone with a six or seven inch ledge extending out from the wall from the front door clear around the building. We, teacher and all, would start at the front steps and try to stay on the ledge clear around. We all had our finger holds to keep from falling off. I could keep my eye on the three little ones who brought toys from home or had other ideas for play. [Jackson County Historical Society (1989), pg. 19]

For reasons that have never been clear to me, heuristics is a topic formally ignored in science, mathematics, and engineering education. Neither does it appear to be encouraged – perhaps it is even actively *discouraged* – by pre-collegiate education. Yet heuristic appears to be how most major scientific theories are discovered, how practically all innovative engineering inventions are made, and how unfamiliar problems in mathematics are solved. In contrast, American education – and not alone in human endeavors – appears to favor rote algorithmic processes – the companion to rote memorization. There are some who argue that emphasizing algorithmic procedure promotes rigid thinking. Personally, I disagree; I say an emphasis on algorithmic procedure encourages a person to not think at all. Anything that can always be handled algorithmically can always be handled by a machine – and probably should be.

Margaret Boden, a psychologist noted for her work in artificial intelligence and cognitive science, wrote,

Given that a finite intelligence usually can consider only some possible answers to a question, on which ones should it concentrate? Random methods are sensible only when the problem domain (or one's knowledge of it) is virtually unstructured. Thus a hatpin may be useful for placing bets on horses, but for most problems one needs not hatpins but heuristics. A heuristic is a method that directs thinking along the paths most likely to lead to the goal, less promising avenues being left unexplored.

Heuristics are sometimes contrasted with algorithms, it being said that the former are inherently fallible rules of thumb whereas the latter are methods guaranteed to succeed. But if heuristic thinking is understood as *directed* thinking, this contrast is not strictly accurate. Some procedures are algorithmic but not heuristic; for instance, the brute force method par excellence, random exhaustive search. Many are heuristic but not algorithmic . . . A few poor specimens are neither . . . And some are both [Boden (1977), pg. 347].

Heuristic search theory is a specialized sub-discipline within the fields of artificial intelligence and cognitive systems theory. Without dipping into the technical jargon used by theorists, the basic idea of heuristic search might be best described as "organized groping." There are generally a few known 'tricks of the trade' and 'rules of thumb' one can try in attempting to solve a problem. A heuristic problem solving approach will try one, see if it seems to lead anywhere promising and, if not, switch to another, try it, see if it seems to go anywhere, &etc. until you either discover a solution or give up on trying to solve the problem. In order to be very good at problem-solving, a problem-solver needs to have in his possession a collection of such 'tricks of the trade' and 'rules of thumb'; but he *also* needs practical schemes by which he directs the order in which he tries them, recognizes whether or not each one tried continues to seem promising, and rules for recognizing when it might be time to switch from using one trick to another after some degree of progress seems to have been made using the first one. This last "tool in the problem-solving tool-kit" is needed because many problems do not yield to just *one* "trick of the trade" but, rather, yield to a particular *series* of heuristic tricks.

Psychologists have known for a long time that human beings are heuristic problem solvers. Leavitt devoted a considerable discussion to this without using the word 'heuristic' [Leavitt (1972), pp. 59-70]. Piaget observed appearances of heuristic problem solving behaviors in infants during the fourth stage of sensorimotor development [Piaget (1952), pp. 210-262]. The *capacity* for it is part of human nature. Why, then, does it need to be taught? There are at least two good reasons for it: (1) every ability that is incorporated into habits improves with continual practice; (2) an ability can be atrophied and crippled by practices that *discourage* its use. Our modern teaching paradigms in mathematics (starting in primary school), science, and engineering have, since the 1970s, become progressively more algorithmic and do, even though unintentionally, discourage pupils from developing their heuristics skills by imparting the message "that is not the way to do it; here is the right *algorithm* or *procedure* for doing it." If one is inclined to decry "woodenness" and "rigidity" in thinking as a counterproductive or undesirable thing, one would also have to say that the failure to incorporate the first pair of functions of intellect education into the curricula institutionalizes a program of turning pupils into blockheads. When this is instituted early in pupils' educations, at the time when their most fundamental intellectual habits are being formed, it is extremely difficult to reverse the damage later in their lives. As the Jesuits used to be fond of saying, "Give us the boy and the man is ours for life."

4.2.2 The second pair of functions for intellect education is comprised of the non-frustrating technical failure function and non-frustrating social failure function. The former is the function in the personal dimension of the learner, the latter in the social dimension. If one wished to "sound bite" the use of these functions in a motto, a good one would be, "Mistakes are the most powerful learning tool." As a teacher, I always cherished the mistakes my students would make because there was nothing better than their mistakes for focusing their attention on an object and jarring them out of rote thinking and type- α compensation behavior. Mistakes open the gate for type- β behavior. In each course I taught I always found that there was a relatively small set of "favorite mistakes" student after student tended to make year after year. Each of them always helped *me* understand those earlier-developed habits of thinking and/or metaphysical prejudices students had picked up sometime earlier in their lives. Basically, if you know what's wrong you have a good likelihood of being able to fix it, and the mistakes learners made helped me identify what the root problem was by giving me a window for understanding what the flow of their thought process had been and where they had used a false premise. A teacher has to be an applied psychologist.

Failure gets a bad rap in American Society. In education it doesn't get the appreciation it practically deserves. Most English-speakers tend to confuse the concept of "failure" with that of "deficiency" because long ago the word "failure" was given a usage that made the two words synonyms. When "the failure of American education" is discussed or publicized, what people are really talking about is "the deficiency of American education." Most English-speakers tend to look at "failure" in terms of objects. In fact, *failure is a subjective state, not an objective thing.*

What is 'failure'? The real explanation of *failure* is *perception of lack of congruence between the appearance of a phenomenal object and the appearance of an Object of anticipation.* This is its *Realerklärung* from the judicial Standpoint. From the practical Standpoint, and under our specifying concept, this specializes to *perception of lack of congruence between the appearance of an Object of anticipation and the phenomenal appearance of the outcome of an action intended to make the anticipated object actual.* **Anticipation** is *knowledge through which a human being can recognize and determine a priori what belongs to empirical cognition.* Put more simply, it is the ability to perceive objectively what to expect empirically in appearances before the fact. Failure, then, is an unexpected feeling of dissatisfaction, experienced when the appearance of an actual outcome gainsays an expectation produced by anticipation, *and nothing else.* It produces a disturbance to equilibrium and therefore is a teacher's most effective tool for evoking desired type- β compensation behaviors from the learner.

These two functions seek to deliberately introduce failure disturbances in learners. However, and this is a point that must never be forgotten by a teacher, the failure so introduced *must be non-frustrating*. Frustration is rupture in the cycle of judgmentation with initiation of a new cycle in an entirely different action direction. In simpler language, frustration is present when the learner "gives up." Often it takes the form of a type- α compensation behavior that belongs to a class of ignorance behaviors I call "the fox and the grapes compensation." If you recall the old Aesop's fable, a grape-eating fox was frustrated by his inability to get at a bunch of juicy grapes hanging just out of his reach. Thereupon the fox said, "Well, those grapes are sour anyway," and used this as an excuse for giving up his effort to obtain them. It is a class of behavior observable in many arguments little boys have. The observed exchanges go something like: "Yes, it is!" "No, it isn't!" "Yes, it is!" "No, it isn't!" "You're a dummy!" Physicists and mathematicians tend to use compensations of this kind as an excuse for ignoring philosophy and philosophers.

Failure hinders a person's ability to close an equilibrium cycle by using an action scheme. It is, in this connotation, a disturbance to equilibrium and the person will attempt to restore equilibrium by accommodating his action scheme. If he does not succeed, he will grope for other schemes for accommodating himself to the disturbance. *If he eventually succeeds the initial failure was non-frustrating*. If his equilibration attempts fail and all his scheme cycles rupture then he will resort to type- α compensation *or* fall back on schemes that basically call for help. The latter is a practical interpretation of what it is that babies are doing when they cry: they are experiencing some sort of frustrating failure, are unable to equilibrate it using their available repertoire of sensorimotor rules, and have resorted to a practical "rule of last resort" which the innate crying reflex supplies¹⁰. A baby, of course, does not know he is calling for help; he doesn't even have the concept of 'calling for help' yet. The *behavior*, however, has the same practical effect; to use theory of evolution terminology, the innate reflex behavior has survival value.

The practical purposes served by homework problems in science and engineering education are: (1) to subject the learner to non-frustrating failure experiences; and (2) provide the learner with reinforcing rewards for overcoming non-frustrating failures, thus reinforcing the learner's habit-developing heuristics schemes.¹¹ The practical purpose served by grading homework is also twofold: (1) to communicate knowledge of failure to the learner; and (2) to provide help the learner needs in order to avoid type- α compensation if the problem turns out to be a frustrating rather than a non-frustrating failure. In my opinion, a teacher better serves the purpose of his position when *he* grades the homework rather than *outsources* this task to a grader. The latter is not an uncommon practice in higher education. I have tried it both ways, and my experience has been that I am a more effective teacher when I do not use the services of a grader.

Related to this is a trend in science, math, and engineering textbooks during the past half-century. This trend has been one of increasingly poorer homework problem design, with the result that today a majority of textbook problems present frustrating rather than non-frustrating failure experiences. When I was teaching, I often had to design my own homework problems to assign to my students because the ones in the textbook were unsuitable for providing non-frustrating failure experiences. The situation has become one of the foremost urgent problems for science, mathematics, and engineering in higher education. One partial cause of it is that textbook authors too often outsource homework problem design to graduate student assistants, who are usually too inexperienced to know how to design non-frustrating homework problems that have educational value and have not been taught how to properly design a homework problem.

¹⁰ One of the things experienced mothers can tell you is that a baby's crying vocalizations rapidly develop. Mothers learn to recognize differences in vocalizations and, e.g., can tell the difference between when the baby is annoyed or irritated and when the baby is frightened or in pain or in distress.

¹¹ The theoretical purpose served by homework is to improve the learner's understanding of the topic by stimulating concept-production and context-structuring in his manifold of concepts.

The **non-frustrating technical failure function** is inclusion in the curriculum of non-frustrating failure experiences involving dead-matter objects. The **non-frustrating social failure function** is inclusion in the curriculum of non-frustrating failure experiences involving live-matter objects – specifically, other people interacting with the learner in situations where cooperation is necessary for success. The terms technical and social refer to the method by which the learner achieves success. Technical failure denotes failure provoking experiences in which re-equilibration is possible by means of technical maxims of personal skill. Social failure denotes failure provoking experiences in which re-equilibration is possible by means of maxims for obtaining cooperation from other people. The object of the former is development of *maxims for seeking* technical maxims of skills. The object of the latter is development of *maxims for seeking* maxims of social skills.

4.2.3 The last pair of functions for intellect education is comprised of the civics planning function (personal dimension of the learner) and the civil planning function (social dimension of the learner). These functions of intellect education extend corporal learning (the learning achieved by accommodations in the practical manifold of rules) by means of conceptualization, i.e., by the production of *concepts* of action schemes in the learner's manifold of concepts. Furthermore, these functions are aimed at generalizing and augmenting the limited particular schemes acquired through corporal education so that they may be applied in many situations. The mechanism for this generalization is the conceptualization of type-β compensations.

Whereas previously the discussion has placed much emphasis on Piaget's "periphery" (in the context of cognizance "moving from the periphery to the center"), these functions are squarely aimed at the "center" of cognizance and the central role cognition plays in the learner learning how to discover *options* for dealing with situational variations. Understanding this calls upon three ideas: procedural schemes; presentative schemes; and procedural schemata (figure 7).

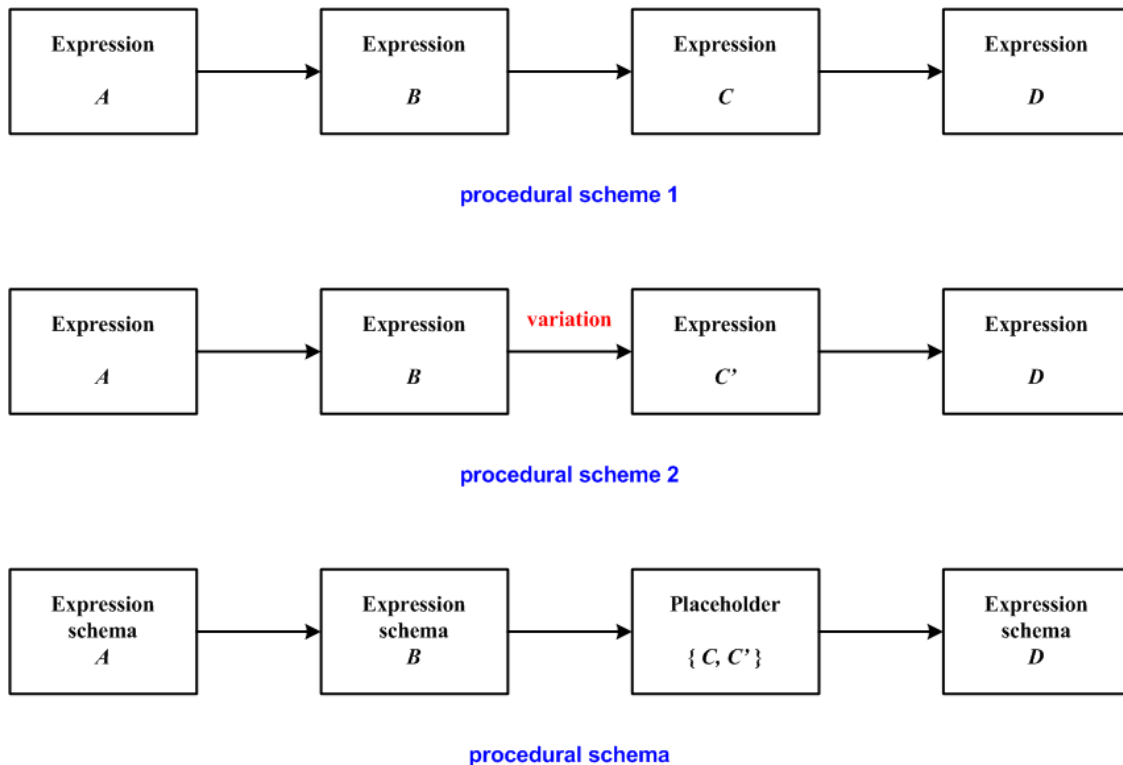


Figure 7: Procedural schemes and a procedural schema of their synthesis in the manifold of concepts. Before this synthesis can occur, both procedural schemes must be conceptualized as presentative schemes.

The empirical discoveries summarized in these ideas were among the last extensions made to the theory of schemes by Piaget and his coworkers in the early 1980s. Piaget wrote,

[We] have discussed the relations between the formation of possibilities and problems of equilibration. Our new observations not only extend our general model, which had seemed sufficient until now and which attempted to explain the operational structures by the mechanism of self-regulation, but also provide the key we were looking for to find a simple, direct answer to the most difficult question raised by our interpretations: By what mechanism do cognitive reequilibrations bring about, simultaneously and of necessity, compensations and novel productions – that is, an equilibration leading to advances (augmentative equilibration)? [Piaget (1981), pg. 150]

A **procedural scheme** is a *specific temporal sequence of action expressions*. Figure 7 provides an illustration of two similar procedural schemes of expression differing only in action expressions *C* and *C'*. The latter results from a type- β compensation to original scheme *C* that assimilates some variation in observable outcome of action expression *B*. A procedural scheme is directly defined by action sequence appearances and is a structured practical rule in the manifold of rules. In Piaget's cognizance terminology, a procedural scheme is "in the periphery" and a person is not conceptually aware of it as such. Cognizance of the scheme requires that it be conceptualized in his manifold of concepts, and when this is done that concept structure is called a presentative scheme.

A **presentative scheme** is a *concept of a succession in intuition that has been connected in a specific temporal order structure and which regenerates a specific sequence of motoregulatory emotivity in the manifold of Desires to reproduce a procedural scheme*. A concept is a rule for the reproduction of an intuition and so a presentative scheme reproduces an intuition that is assimilated into the original procedural scheme. A presentative scheme has the peculiarity that it is not itself depicted in the manifold of rules. It does not have to be. All that is required of it is a connection, made by reflective judgment, to its associated procedural scheme in the manifold of rules (figure 6). *This connection effects the presentative scheme's meaning implication*. Its intuitive re-presentation in sensibility is a representation assimilated into the procedural scheme in the practical manifold.¹²

The possibility of conceptualizing a presentative scheme requires ratio-expression in practical Reason employing determining judgment to produce accommodation of perception that results in an equilibration. The accommodated intuition in sensibility that produces the satisfaction of equilibrium is what is conceptualized as the presentative scheme in the manifold of concepts (figure 6). Later intentional employment of the presentative scheme requires only ratio-expression by appetitive power that directs determining judgment to re-introduce it into the synthesis of apprehension. The process of determining judgment does not determine its own employment. Rather, it is under the regulation and command of the process of speculative Reason, which orients and directs its activities via acroams of transcendental regulation (figure 6).

Because a presentative scheme is a concept this means that that presentative schemes sharing some of the same concepts within their manifolds can be further generalized to produce abstract concepts that represent *species* of presentative schemes. This type of higher concept, under which stand two or more presentative schemes, is called a **procedural schema**. A procedural schema

¹² When a concept is judged by determining judgment it is combined with other concepts in the manifold of concepts. The functions of combination are called the *categories of understanding*. Among these are the categories of Modality in understanding. These primitive notions are, from the transcendental perspective of the theoretical Standpoint, *signs of expedience* denoting how the intuitive perception that the concept reproduces coheres with activity expression via the emotivity of reflective judgment [Wells (2009), chap. 5, pp. 190-193]. A presentative scheme is *made to be a sign of the procedural scheme* it represents.

coordinates particular presentative schemes, retaining what these presentative schemes have in common and making abstraction of those places within them where they differ. This act of abstraction, however, does not *eliminate* the positions in the order structure where the lower schemes differ. Concepts at the points in the sequence where two presentative schemes differ are classified under the procedural schema so that inclusion of one of these concepts in a particular procedural scheme expression precludes the placement of the others in that expression. The members of the disjunction are called *options* because they can be chosen in determining particular expressions of a procedural schema according to the action of a rule of exception. The positions within a procedural schema where options can be inserted are called *placeholders*. The members of the disjunction taken collectively constitute *option sets*. Once an individual has option set concepts available in his manifold of concepts he becomes capable of combining them with his capacities for anticipation to conceive and execute *plans*.

A plan is a representation of an anticipation constructed as a temporal order structure with embedded observable conditions for determining specific temporal sequence expressions. Embedding field models consistent with the Piagetian concept of procedural schemes were first presented by Grossberg in the early years of embedding field theory [Grossberg (1969), 1970)] and used in rudimentary models of sensorimotor development [Wells & MacPherson (2009)]. Rudimentary embedding field models for plans and plan execution were presented in Grossberg (1978a). At that time no explicit connection between Grossberg's mathematical models and psychological postulates from Piaget's empirical studies had been made (except by allusion to circular reactions). Today there still remains a good deal of mathematical development to be done in tying Grossberg's embedding field theory to the concepts of procedural schemes, presentative schemes, and procedural schemata discussed here. However, there does not appear to be any fundamental impediment to accomplishing this now that studies and the development of mental physics have clarified the key details described above concerning manifold involvements and the succession of stages in which the capacity to formulate plans develops.

In at least one way, the learning of procedural schemata is the crowning achievement of intellect education. Procedural schemata do not add to a person's pool of knowledge in regard to knowledge of specific objects. Rather, a procedural schema adds to what the person *can do with his existing knowledge* of specific objects. But this is the practical explanation of what intelligence is. ***With every additional procedural schema a person constructs, his intelligence increases.***

Intelligence is not an occult quality each person has in some predetermined amount. To presume this, as all intelligence testing inherently does or implies, is perhaps one of the greatest blunders and cruelest enormities either psychology or education science can commit. Among other things, making such a supposition leads to education institutions giving up on some learners who, either from physiological or experiential handicaps, merely *seem* to be less intellectually capable than others. That these learners are less capable *at some particular point in time* than others is true. But it is an error to focus on their *exhibited* capacities and use this as an excuse to neglect their *potential* capacities. Eugenics pogroms are based on such thinking. It is an even more perverse enormity to convince a person he has an intellectual handicap he is powerless to overcome. If you cause him to believe he is powerless to overcome it, he will not try to overcome it. And this is what happens when school officials or psychologists use their presumed authority to tell a young person he is autistic, has attention deficit disorder or some other mental deficiency.

Those individuals, true enough, must be taught differently than the main classrooms teach the majority of learners in the same age group. But this is only because, owing to whatever cause, those individuals come into the schooling system with underdeveloped procedural or presentative schemes and so have an educational disadvantage relative to others of the same age in regard to their *readiness* to develop procedural schemata. It is an individual's stage of mental development

and not his age that must become the determiner of where he is placed within a succession of classroom levels. I won't say it any other way than to say labeling these learners with whatever labels (mental retardation, autism, attention deficit disorder, or whatever) is a heinous injustice because systems of education *use it as an excuse* to neglect educating them for intelligence development and to deny them opportunities for it. This is nothing else than *intellect* eugenics.

The *civics planning function* is *inclusion in the curriculum of exercises that stimulate the learner's development of procedural schemata applied to technical objects*. The adjective 'civics' is applied to this function because the procedural schemata it aims at are schemata pertaining to how the individual determines his expressions of actions. *His Society has expectations for these expressions*, namely that they will conform to social limitations of natural liberties.

For example, every person has the *natural* liberty to try to improve his own personal welfare by means of doing quick and shoddy work in his personal enterprise activities. However, those who purchase products of this work will soon enough become sufficiently dissatisfied with those products, and tell others of their dissatisfaction, that the individual finds fewer and fewer outlets for his goods or services to the detriment of the very welfare he seeks to improve. Indeed, the practice of natural liberties of this sort might come to be legally proscribed by his Society, in which case their exercise is made criminal. There are, in other words, inherent social expectations for how he carries out his enterprise activities. These expectations impose *de facto* limitations on his liberty of action. The liberties his Society does allow him in his exercise of personal enterprise activities make up an implicit part of the individual's civil liberties that can properly be called *pragmatic* liberties. These are never independent of planning for the factors in a person's socio-economic environment. Sandburg seemed to be alluding to something like this when he wrote,

"I came to a country,"
said a wind-bitten vagabond,
"where I saw shoemakers barefoot
saying they had made too many shoes.
I met carpenters living outdoors
saying they had built too many houses.
Clothing workers I talked with,
bushelmen and armhole-basters,
said their coats were on a ragged edge
because they had made too many coats.
And I talked with farmers, yeomanry,
the backbone of the country,
so they were told,
saying they were in debt and near starvation
because they had gone ahead like always
and raised too much wheat and corn,
too many hogs, sheep, cattle.
When I said, 'You live in a strange country,'
they answered slow, like men
who wouldn't waste anything, not even language:
'You ain't far wrong there, young feller.
We're going to do something, we don't know what.'" [Sandburg (1936), pg. 73]

The *civil planning function* is *inclusion in the curriculum of exercises that stimulate the learner's development of procedural schemata applied to social situations*. These schemata pertain to the preservation of the Society's moral customs (mores and folkways) while, at the same time, providing for evolutionary Progress as these customs are adapted over time to deal with changing circumstances. For example, every person has the *natural* liberty to try to settle disagreements by killing those with whom he disagrees; every Society on earth prohibits the

exercise of this natural liberty in its social compact. On the other hand, every Society is also faced with the challenges of dealing with outlaws and criminals embedded within its population. It is a simple matter of history to see that how Societies choose to do so evolves over time. There was once a time when anyone who committed any defined crime was simply executed. In the United States today, I think it is accurate to say an overwhelming majority of American citizens would be aghast at a proposal to execute someone for stealing a loaf of bread.

These functions all pertain to the matter of the learner's *abilities to determine his own actions* but not to the objects on which he acts or utilizes in acting on other objects. The latter have to do with his connections to the world around him and belong to tangible and persuasion education.

§ 4.3 The Functionals of Tangible Education

The tangible power of a person subsists in his stock of tangible economic goods, fungible skills, and personal stock-of-time. Tangible economic goods consist of tangible physical objects a person owns according to the conventions established by his Society that define 'ownership' [Wells (2010), chap. 7] and labor services he exchanges for consumable or capital revenue. Fungible skills are intangible potential economic goods subsisting in the skills the person can put to use as economic goods by converting them to labor services. Note that there is a difference between the concept of the labor service one *actually* provides and the concept of a skill needed to be *able* to provide it. The former is the concept of a kinetic good, the latter that of a potential good. The revenue one obtains with the former is directly related to the latter because fungible skill is a principal determiner of the economic supply of labor service. Almost any sixteen-year-old can provide manual labor services; very few sixteen-year-olds yet possess the fungible skills necessary to provide engineering design or legal advice services. Adam Smith wrote,

The five following are the principal circumstances which, so far as I have been able to observe, make up for a small pecuniary gain in some employments, and counterbalance a great one in others: first, the agreeableness or disagreeableness of the employments themselves; secondly, the easiness or cheapness, or the difficulty and expense of learning them; thirdly, the constancy or inconstancy of employment in them; fourthly, the small or great trust which must be reposed in those who exercise them, and, fifthly, the probability or improbability of success in them. [Smith (1776), pp. 58-59].

Fungible skills pertain to Smith's second and fifth principal economic circumstances.

From the point of view of the learner, his direct interest in tangible education is increase in the tangible power of his person by means of increasing his stock of fungible skills. Tangible *Person-fähigkeit* is his principal means for being able to realize Duties-to-himself and Duties to others in his personal society to whom he has pledged himself. But as keenly immediate as a learner's interest in tangible education is, *his Society has no immediate interest in it*. This is something that has fueled many vigorous debates over 'private' vs. 'public' education. Why should Society bear the costs of an individual's personal tangible education out of its stock of public economic goods? Without a *quid pro quo* benefit to *every* member of the civil association, tangible education must be the private concern of at most only a few individuals and public funding for it is unjustifiable.

There *is* a social *quid pro quo* but it lies in a *remote* common interest inherent in the basic reasons people ally themselves with one another by mutually pledging themselves to be bound by a social contract. This interest is *common tangible security*. Rousseau expressed it thusly:

Let us draw up the whole account in terms easily commensurable. What a man loses by the social contract is his natural liberty and an unlimited right to everything he tries to get and succeeds in getting; what he gains is civil liberty and the proprietorship of all he possesses. If we are to avoid mistake in weighing one against the other we must clearly

distinguish: (i) natural liberty, which is bounded only by the strength of the individual, from civil liberty, which is limited by the general will; and (ii) possession, which is merely the effect of force or the right of the first occupier, from property, which can be founded only on a positive title. [Rousseau (1762), pp. 19-20]

Civil liberties assured by social contracting make each individual more secure in his individual pursuit of happiness. The difference between 'possession' and what Rousseau calls 'positive title' is quite simple. Anything you possess is something someone else can try to take from you. If, however, you have a positive title declaring that you not only possess it *but that it is your property* (which is something established *only* by social convention), then if someone tries to take it from you your allies in the civil association *are all bound to defend you and your property* from seizure by others acting outside the social compact. Security in your possessions is part of the *quid pro quo* for your act of social contracting. Without it a dangerous state-of-nature situation prevails where no one is the least bit secure in anything. Sandburg gave an illustration of this:

"Get off this estate."
 "What for?"
 "Because it's mine."
 "Where did you get it?"
 "From my father."
 "Where did he get it?"
 "From his father."
 "And where did he get it?"
 "He fought for it."
 "Well, I'll fight you for it." [Sandburg (1936), pg. 75]

Every person's security in his person and possessions is only as strong as the united strength of his civil Community reciprocally bound by social contract. If most people in that community are weak, their united strength is weak. Conversely, what increases the strength of any individual increases the strength of their union and improves the general welfare of the Community to the benefit of all its members. In this augmentation lies a Society's common interest that is to be served by *public* tangible education. In one of the many parts of *The Wealth of Nations* that is never quoted by uncivic free enterprise propagandists, Smith wrote,

The liberal reward of labor, therefore, as it is the necessary effect, so it is the natural symptom of increasing national wealth. The scanty maintenance of the laboring poor, on the other hand, is the natural symptom that things are at a stand, and their starving condition that they are going fast backwards. . . . Is this improvement in the circumstances of the lower ranks of the people to be regarded as an advantage or as an inconveniency to the society? The answer seems at first sight abundantly plain. Servants, laborers, and workmen of different kinds make up the far greater part of every great political society. But what improves the circumstances of the greater part can never be regarded as an inconveniency to the whole. No society can surely be flourishing and happy of which the far greater part of the members are poor and miserable. It is but equity, besides, that they who feed, clothe, and lodge the whole body of the people should have a share of the produce of their own labor as to be themselves tolerably well fed, clothed, and lodged. . . . The liberal reward of labor, therefore, as it is the effect of increasing wealth [of a nation], so it is the cause of increasing population. To complain of it is to lament over the necessary effect and cause of the greatest public prosperity. [Smith (1776), pp. 65, 69-70, 72]

Smith sketches out in plain economic terms that the inevitable consequence of diminution of the tangible *Personfähigkeit* for 'the greater part of every' Society is the diminution of the welfare of the entire Society. When the general welfare diminishes too far, the Society disintegrates and falls. Examples include France in 1789 and Somalia in modern times.

There are those who argue that such a diminution merely settles to a new point of economic equilibrium; these arguments tend to present this as if it were an economic theorem. In fact, Smith states no such theorem. It can only *be* a mathematical theorem if one draws a false real division between economic human nature and political human nature and *further* premises that socio-political circumstances do not change as socio-economic ones do. That premise, though, is foolishly naïve and history repeatedly gainsays it. Examples include the breakdown of the Roman Republic in the years just preceding Caesar and the breakdown of France in the years just prior to the French Revolution. Civil war and an accompanying Somalia-like disintegration into a state-of-nature interregnum, not economic reequilibration, is the historical pattern following generally diminishing tangible *Personfähigkeit* affecting the greater part of a Society. For example,

The population stood by and watched the combatants; and, as though it had been a mimic conflict, encouraged first one party and then the other by their shouts and plaudits. Whenever either side gave way, they cried out that those who concealed themselves in the shops, or took refuge in any private home, should be dragged out and butchered, and they secured the larger share of the booty; for, while the soldiers were busy with bloodshed and massacre, the spoils fell to the crowd. It was a terrible and hideous sight that presented itself throughout the city. Here raged battle and death; there the bath and the tavern were crowded. In one spot there were pools of blood and heaps of corpses, and close by prostitutes and men of character as infamous; there were all the debaucheries of luxurious peace, all the horrors of a city most cruelly sacked, till one was ready to believe the Country to be mad at once with rage and lust. [Tacitus (c. 100 AD), Bk. III, § 84]

This happened in the year 69 AD. The city where it happened was Rome. These Roman circumstances have their modern parallels exhibited, *e.g.*, in Mogadishu from 1991 to the present.

The specifying concept for public tangible education is the Society's social contract [Wells (2012a), chap. 8]. The main question bearing on American public instructional education is: Does the American social contract imply a commitment to public tangible education? Strong arguments can be mounted that it originally did not. Few things more clearly delineated political differences between the New England, Middle, and Southern states after independence than their regional attitudes concerning public vs. private education [Cubberley (1919), pp. 15-24]. It is equally beyond reasonable doubt that many of the Patriot leaders foresaw public education as a crucial requirement for the American Experiment to succeed [Hansen (1926)]. More citizens came to view public tangible education in some form as a necessary civil right as the American industrial revolution progressed. Today there is very little reasonable doubt that by 1900 the fundamental social contract question had been answered in the affirmative, albeit in vague and general terms and not in fine detail. School curricula and various education movements had demonstrated this by the start of the 20th century [Wells (2013), chap. 9]. The Progressive Education Movement made many serious errors in its efforts to implement tangible education, but it did not err when it held public tangible education to be a necessary function of public education overall.

4.3.1 Social-natural tangible public instructional education has six basic functions it must provide. The first pair is comprised of the lessons of vocation function and the lessons of *mos maiorum*¹³ function. I begin with the *lessons of vocation* function: *inclusion in the curriculum of lesson-matters pertaining to developing the learner's personal vocational taste*. Two of the great presuppositional errors committed during PEM reforms were: (1) some reformers presumed learners came into the education system with either prefixed or natural *biases* concerning their interests in tangible education; (2) other PEM reformers thought it was possible for educologists to *make* tangible education choices for learners (commencing when they were 12 years old) and impose these choices on the learners. Both presumptions are contrary to human nature and unjust

¹³ *Mos maiorum* means "greater established custom."

under the social contract.

The lessons of vocation function is not aimed at any particular job skill. Instead, it is aimed at the more fundamental and vital task of cultivating the learner's *character* in regard to desired judgments of taste that orient his future vocational choices. The metaphysical axiom governing this function states *learner tastes are formable through instructional education*. In this Critical doctrine of public education the term "vocation" refers to affective perceptions of judgments of taste that are perceived as what is often described as a person's "calling in life." This, you should recall, is the basic real connotation of the word "vocation." The question that follows is: what sort of vocational tastes must a Society regard as "desirable" in the context of its social contract? Here what is to be deemed "desirable" is so-deemed *in the Enlightenment context of Progress* in the general welfare of Society overall.

Economics is oftentimes described both as the science of determining the allocation and use of scarce resources and as the science of the production, distribution, and consumption of wealth in human Society. So it might be if the nature of wealth assets was static and unchanging. But there is nothing farther from the truth. Wealth assets are wealth assets because people choose to regard them as such. Thirty years ago an Internet web browser was not a wealth asset. It wasn't even invented until 1990. That it is a wealth asset in the eyes of millions of people today is beyond reasonable doubt. Once upon a time buggy whips were notable wealth assets; today most Americans will live out their entire lives without ever seeing one. My twelve-year-old neighbor across the street has never even heard of one and thinks "buggy" is something that has to do with application software. If I were to ask him to tell me what a "buggy whip" is, I wouldn't be very surprised if he told me it was a device used to punish bad software writers.

There are some wealth assets that are limited natural resources. Potable water comes to mind. The total amount of water on earth is finite and thus is a resource limited by physical nature. Will it always be? If someone asked me to make a bet, my bet would be 'yes,' but on the other hand I do not know that it will always be such. Simply because it is not manufactured today does not mean it will never be a manufacturable good. "Never" is a very, very long time.

My point is that the great majority of all things that are deemed to be wealth assets today did not even exist a century ago. It is mere habit to regard "vocation" as a synonym for "job" because it is a mere habit to take the quite frankly too-narrow concepts of what 'economics' is and what 'wealth assets' are as definitive. In any case, it is not the function of public education to cultivate any specific occupation. Rather, the function calls for cultivating qualities of personal character found exhibited by persons in successful pursuit of their own vocational interests. What are these qualities? They can only be described with real objective validity in practical terms, not in terms of job skills. For a foundation, it is difficult to improve upon the description given by Mill:

What, for example, are the qualities in citizens individually which conduce most to keep up the amount of good conduct, of good management, of success and prosperity, which already exist in society? Everybody will agree that those qualities are industry, integrity, justice, and prudence. But are not these, of all qualities, the most conducive to improvement? and is not any growth in these virtues in the community in itself the greatest of improvements? If so, whatever qualities in the government¹⁴ are promotive of industry, integrity, justice, and prudence, conduce alike to permanence and progression; only there is needed more of these qualities to make the society decidedly progressive than merely to keep it permanent.

What, again, are the particular attributes in human beings which seem to have a more especial reference to Progress, and do not so directly suggest the ideas of Order and Preservation? They are chiefly the qualities of mental activity, enterprise, and courage. But are

¹⁴ including public education. Public education is part of Republican government.

not all these qualities fully as much required for preserving the good we have as for adding to it? If there is anything certain in human affairs, it is that valuable acquisitions are only to be retained by the continuation of the same energies which gained them. [Mill (1861), pp. 13-14]

The lessons of vocation function pertains to the personal dimension of the learner. The function in the dimension of the learner-as-a-member-of-society is the *lessons of mos maiorum* function: *inclusion in the curriculum of lesson-matters orienting the learner's Self-developed principles of mores and folkways to be in congruence with those of his Society*. Just as there is a locality-dependent diversity of special mini-Community interests, so also there are locality dependent variations in folkways found in a geographically large nation such as the United States. Pronounced differences in the folkways of, e.g., New York, Iowa, Texas, California and the other states are easily observable; at education levels from the district to at least the state levels the lessons of *mos maiorum* should reinforce and reflect local customs. At all levels, the learner must be taught the mores held in common by citizens throughout the United States. These include such matters as: respect for just laws; tolerance for the divers religions of America; racial and ethnic tolerance; equal treatment under the law regardless of race, ethnicity, gender, or age; a high value placed on individual industry and honesty, friendliness and neighborliness; and the Duties of U.S. citizenship under the American social contract.

The common mores of American citizenship, not surprisingly, are also mores found in the non-denominational elements of the religious doctrines held by *all* the major religions represented in America. It was also once made part of moral leadership training in the Armed Forces and their civilian auxiliaries. Kullowatz listed four of these in the Civil Air Patrol moral leadership manual:

- mores regarding the basic dignity and rights of the individual – "that all men are created equal; that they are endowed . . . with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness";
- the precept that each individual bears a personal responsibility to all other individuals in the protection and development of these rights;
- the precept that government and all duly constituted authority exists for the sole benefit of the people;
- the precept that in order for this to be effected each person must accept responsibility toward their government. [Kullowatz (1961), pg. 11]

Other character traits Kullowatz listed as essential virtues respected by American Society include:

- thirst for knowledge and accomplishment;
- development of vision and total awareness of opportunities;
- formulation of goals with a system of values;
- initiative;
- sense of Duty;
- perseverance;
- courage;
- dependability;
- optimistic enthusiasm;
- charity;
- sincerity;
- prudence and common sense;
- moderation in living;
- honesty and personal integrity;
- sense of justice;
- conviction and devotion to principle. [*ibid.*]

That all of these things are principles debated and disputed by philosophers over the centuries matters not at all. Nor does any individual's personal religion (or lack thereof) matter at all. In regard to lessons cultivating these things, the bottom line situation is that these *are* character traits that American Society *does* expect of its citizens and for that reason they are *empirically pertinent* to the function of lessons of *mos maiorum*. The empirical demonstration that these things are expectations of American Society is found in this: perceived *lack* of these qualities of character *are* censured by other people and imputed to be character flaws in an individual who is perceived by others as lacking them. Imputations of this kind hinder the development of social-chemical bonding between individuals and groups, and in more extreme cases can lead to the development of social-chemical antibonding relationships. However, *all* of these character traits are *developed* traits that do not necessarily arise as inherent consequences of Obligations-to-Self. They therefore must be made part of and taught during the process of cultivating the socialization an individual in preparation for his life as a citizen.

Churches, of course, perform an important role in this socializing function and one would hope they will continue to do so. Nonetheless, *mos maiorum* is not a private interest of religions but a public interest of Society as a whole that cannot be taken for granted. For this reason the function is a required function in the institution of public instructional education. *Mos maiorum* is not a religious matter; it is a social matter. Teaching it is not religious instruction; it is instruction for the learner's Self-accommodations by which he becomes able to be assimilated into his Society.

4.3.2 The second pair of functions of tangible education is comprised of the skills of civil liberty function (personal dimension of the learner) and the skills of enterprise function (social dimension of the learner). Skills are action schemes and the learner must learn, conceptualize and develop them through the practice of doing them. Instructional education must provide a subject-matter for practicing the scheme and must also establish a condition that evokes in the learner a choice to actualize his Self-educational activities. Two conditions are needed for ensuring that lessons evoke skill-related accommodations in both the learner's manifold of rules and his manifold of concepts such that the learner undertakes more than mere rote memorization or "going through the motions" according to maxims of prudence (*e.g.* to avoid being singled out for embarrassment or punishment). Those prudential maxims are type- α compensation behaviors. The conditions are: (1) the learner must *recognize he is making Progress* in perfecting his *Personfähigkeit*; and (2) at the same time he must *recognize that his Community makes essential contributions* making his Progress possible. Both of these conditions are reached by stimulating the learner's feelings of self-respect, *i.e.*, value feelings that reflect a person's pure *a priori* interest of Self-respect¹⁵. The functions of empirical tangible education are functions that stimulate such value feelings and consciously link them to examples of particular subject-matter skills.

The *skills of civil liberty function* is inclusion in the curriculum of lesson matters developing the learner's sense of self-respect by development and practice of basic skills that he can recognize as being pertinent to his ability to achieve Welfare success in life. The lessons and instruction are designed to appeal to the learner's self-interest in his own future personal welfare. Most existing school courses and teaching methods presently in use in the common practices of teaching can be said to aim at trying to achieve the outcome of this function (skill development) by other means. The PEM's differentiated curriculum reforms were motivated by good intention, *viz.* to look out for learners' future Welfare success. However, this reform miscarried by presuming educologists could be competent judges of what these Welfare interests were¹⁶. In

¹⁵ The notion of Self-respect is the notion of the first and pure *a priori* interest of practical Reason. It is the notion of absolute coherence with the formula of the categorical imperative of practical Reason. The idea of self-respect is the idea of the representation of a value that reflects the human interest of Self-respect.

¹⁶ The supposition was inherent in the PEM's premise of using Plato's *Politeía* as their model goal for education reform [Dewey (1916), pp. 96-100]. Plato apparently believed that the ant-like communism he

consequence, the learning function and its power to motivate went unrealized.

It is fundamental to clearly recognize that this function is not the same thing as subject-matter. The subject-matters of coursework are *means* of developing important practical skills, but the achievement of robust *learning* is achieved by success in cultivating the learner's sense of self-respect which comes from his recognition that his own *Personfähigkeit* is augmented by the skills he is acquiring. Some subject-matter skills – e.g., reading, writing, mathematics, and basic skills in problem-solving and design – are important for all vocations and all occupations. Others – e.g. a general working knowledge of science – are essential for fulfillment of a citizen's political Duties in a Republic. Still others are propaedeutic for specialized occupations. But *all* tangible skills are first grounded in the learner's feelings of self-respect that skill acquisition cultivates. Dewey seems to have at least intuitively apprehended this idea when he wrote,

To "learn from experience" is to make a backward and forward connection between what we do and what we enjoy or suffer from things in consequence. Under such conditions, doing becomes a trying; an experiment with the world to find out what it is like; the under-going becomes instruction – discovery of the connection of things.

Two conclusions important for education follow. (1) Experience is primarily an active-passive affair; it is not primarily cognitive. But (2) *the measure of the value* of an experience lies in the perception of relationships or continuities to which it leads up. It includes cognition in the degree in which it is cumulative or amounts to something, or has meaning. [Dewey (1916), pg. 153]

Critically, a value is a form of an affective perception of a desire presented as a sense of interest. The value Relation of self-respect is an *absolute* value in *homo noumenal* human nature. Course subject-matters are means by which a learner's value of self-respect becomes attached to external things and happenings in the world around him, but these subject-matters are never a causative factor in educational Self-development. The causative factor subsists in the function.

Success in teaching the first function does not by itself ensure that the public purpose of public instructional education is fulfilled. That fulfillment calls upon the second function, the *skills of enterprise: inclusion in the curriculum of lesson matters perfecting learner self-actualization by practice in applying new skills in enterprise activities within social situations*. Through these skills he learns to recognize value in social cooperation. In whatever enterprise an individual undertakes to serve his Duties-to-himself by means of the tangible power of his person, that enterprise will take place in relationship to those of other people. If the person engages in uncivic free enterprise, his enterprising actions are likely to produce numerous situations in which other people's similar engagements hinder his success even as his actions hinder theirs. Competition in such circumstances rarely leads to cooperations that benefit all those involved. Minimally, non-synergy is the more likely result and the likelihood of anti-synergy (conflict) from their divers enterprises is increased. To paraphrase Donne, no man is an economic island entire to himself. A learner must learn how to conduct his own enterprise activities harmoniously with those of other people, and that is the aim of the skills of enterprise function in education. The learner's enterprise in this case is thereby oriented to be a *civic* free enterprise.

4.3.3 The last pair of functions for empirical tangible education is comprised of the co-operation of skill enterprises function (personal dimension of the learner) and the cooperation of social Enterprise function (social dimension of the learner). As the names suggest, these functions are aimed at cultivating the learner's general skills for determining his activities in such a way that his activities are made to be not only congruent with those of others but, additionally, so that their aggregate activities mutually reinforce one another's. These are skills different from skills of

proposed really was best for the welfare of all its members, from its worker drones to its philosopher king.

individual enterprise. The latter pertain to the individual's tangible *Personfähigkeit*. The former pertain to social-chemistry in the Enterprise protein structure of corporate economics.

The lessons of the skills of enterprise function pertain to the learner's interest in his own Welfare. Those of the two cooperation functions, in contrast, pertain to the learner's interest in his domestic tranquility. Tranquility is a state of mind that results from being sufficiently satisfied in relationship to one's general state of life such that nothing more or different is desired in this relationship. The learner is or is to become a citizen of the Community and is expected to pledge himself to the terms of its social contract, with it being understood by the Community as a whole that personal achievement a state of tranquility is among *his* conditions for making this pledge and committing himself to social Obligations and Duties.

But Progress in corporate *Personfähigkeit* requires occasional changes and innovations be brought forward and introduced in Society. This is not done by tranquil people. It is only done by people who are not sufficiently satisfied with the way things are and desire to change something. A perfectly tranquil Society could be nothing else than an arrested Society. Nevertheless, Order in Society requires that lack of tranquility among some members of the Community must not develop to the point where cooperation breaks down from competition between the differing special interests of individuals and mini-Communities. The functions of tangible social education are therefore tasked with fostering the capacity for Progress in Society under the constraint that Order must not be sacrificed in its pursuit.

The *cooperation of skill enterprises* function is: *inclusion in the curriculum of group exercises in which the learners have diverse pre-selected skill roles to practice and must cooperate to achieve a group objective*. The group constitutes a predefined mini-Community (defined by the teacher as part of the design of the lesson) and the learners each practice specific skills they must integrate with those of the other learners in order to achieve personal satisfactions through the cooperative activities of the group. This addresses education for achieving tranquility in the personal dimension of the learner.

The *cooperation of social Enterprise* function is: *inclusion in the curriculum of group exercises in which the group is presented with an objective to be achieved and the learners must determine for themselves their own organization and plan for achieving it*. Here the object of the lesson is the skill and value of bringing about cooperation with others. While the learners are undertaking these exercises the role of the teacher is regulatory. The teacher must take leader's actions: (1) to see to it that every learner participates meaningfully in the exercise; and (2) to hinder the emergence of discord and *internecine* competition among the learners. Here I stress that it is *only* *internecine* competition that is to be hindered. Competition that is productive for achieving group success and remains within civic and civil limitations set by the Community's social contract *must be permitted to occur*. Cooperation arises out of competition in the embedding field dynamics of any Society [Grossberg (1978b, 1980)], but will not do so if that competition is *internecine*.

§ 4.4 The Functionals of Persuasion Education

The specifying concept of persuasion education emerges in Critique more or less directly from the acroams that govern its applied metaphysic [Wells (2012a), chap. 9]. The portable concept for this part of the metaphysic is persuasive power in *Personfähigkeit*. In the personal dimension of the learner, this subsists in the learner's ability to sufficiently communicate his thoughts and ideas to other persons and thereby gain their consent, agreement, or cooperation. With regard to the social dimension of the learner, Society's interest in providing his instructional education has its teleological grounding in its corporate persuasive power, which members of the Community assess by their judgments of degrees of accord and discord within the civil Community. The

specifying concept of persuasion education is: *the learner pursues equilibration, to the full extent his liberty of action is unconstrained by the manifold of rules, until he achieves empirical consciousness of a satisfaction of a state of equilibrium.*

The persuasive power of *Personfähigkeit* is the power of the person – whether an individual human being or a corporate person – to sufficiently communicate his (or its) ideas to others to gain their consent, agreement, or cooperation. Successful employment of persuasive power has as the least of its results the avoidance of forming antibonding relationships and as the best of its results the formation of social bonding relationships. Persuasive power is the means by which it is possible for a Society to sustain Order in itself and achieve Progress in its civil Community.

4.4.1 The first pair of functions for persuasion education is comprised of the heuristics of experimental learning function (in the personal dimension of the learner) and the heuristics of social experiments functions (in the social dimension of the learner). Lessons taught in both of these functions pertain to discovery by means of experimentation. Experimenting means nothing more and nothing less than what Bernard called experimental reasoning. Experimental reasoning in science is a specialized case of experimental reasoning by a learner, the main distinction being that traditionally we have called the latter "critical thinking skills." The aim is the same in both cases: to gain knowledge from facts of experience. The social persuasion education functions have as their objective Progress in the learner's skill in doing so. This involves skill in using and developing heuristics as means of experimental reasoning. Inclusion of *exercises* is essential to these functions. To learn the skills, the learner must Self-develop his *practical* maxims of heuristic thinking and reasoning. All meanings are at root practical and practical knowledge, structured in the manifold of rules, always precedes cognitive knowledge structured in the manifold of concepts.

The ***heuristics of experimental learning function*** is inclusion in the curriculum of lessons and exercises in experimental learning of how to discover possibilities and options through the use of heuristics. Possibilities and options, you will recall, are the structural matter of procedural schemata. With regard to the persuasive power of a person this function pertains to the ability of the learner to determine what it is he wishes to persuade others to accept. However, the function itself *exercises and practices* heuristics the learner develops in his intellect education. Through his intellect education the learner learns how to *develop* his heuristics. Through this function he learns how to *use* those heuristics by applying them to problems and situations and he learns how to analyze, compare, and choose from among the options he thereby discovers. The outcome at which the lessons are aimed is the learner's increased capacity to invent procedural schemata to as great an extent as his current stage of mental development allows. It can be properly said that the first person any person needs to persuade is himself. These lessons, in a manner of speaking, are aimed at self persuasion.

The ***heuristics of social experiments function*** is inclusion in the curriculum of lessons and exercises in heuristic social experiments for discovering common grounds and means for negotiating consensual agreements with other people taken both individually and in groups. The function pertains to developing heuristics of consensus building. It aims to cultivate the skills for negotiating differences of opinions and aims so that contradictory interests may be transformed into merely contrary ones, thus making agreement and cooperation possible. Cicero wrote,

We require a man of sharpness, ingenious by nature and experience alike, who with keen scent will track down the thoughts, feelings, beliefs and hopes of his fellow citizens and of any men whom on any issue he would fain to win over by his word. He ought to feel the pulses of every class, time of life, and degree, and to taste the thoughts and feelings of those before whom he is pleading or intending to plead any cause [Cicero (55 BC), Bk I, pg. 159].

This is the sort of personal ability these functions seek to cultivate in the learners. They are nothing less than *leader's abilities*. The goals of these lessons are: first, to cultivate the learner as a leader and to make his expression of sound leader's actions habitual; and, second, to cultivate in the learner the ability to determine when it is appropriate for him to act as a leader and when it is appropriate for him to act as a follower during the leadership dynamics of a group.

With regard to the persuasive power of a person this function pertains to cultivating the learner's individual skills in seeking and evaluating advice and opinions from others, learning to evaluate from their behavioral operationalizations¹⁷ how others are interpreting concepts the learner is trying to communicate to them, learning how to ascertain what others are attempting to communicate to the learner, learning to control his own impatience with others, cultivating the learner's skill in "pulling" desired interpersonal reactions from others, and assessing as accurately as he can what others are and are not willing to do. In Piagetian terminology, the lessons are aimed at removing the restrictions of egocentrism and "de-centering" the learner.

4.4.2 The second pair of functions for persuasion education is comprised of the ends and means planning function (personal dimension of the learner) and the social planning function (in the social dimension of the learner). The educational functions pertain to Progress in learner skills of formulating anticipations of relationships between specific means and specific ends. *Planning* means *devising a scheme for doing, making, or arranging something*. In the practical Standpoint, to plan means to specify within a procedural schema specific placeholder options determined according to actual circumstances (as these are known to the learner) for applying the scheme to meet his predetermined end. In addition, the function teaches him to handle empirical variations as these are encountered during the execution of the plan. An important part of Progress in his persuasive power is capacity to anticipate variations and ability to flexibly react to unanticipated ones. Behaviorally, this equates to a compensation behavior Piaget called 'superior' or **type-γ** behavior [Piaget (1975), pp. 57-60].

The *ends and means planning function* is inclusion in the curriculum of lessons and exercises evoking Progress in the learner's ability to synthesize and identify objective ends he intends to achieve and objective means of achieving them. Planning is a skill of reasoning and it is easy to observe that different people exhibit very different grades of planning skill. In many ways planning is the antithesis of habit, although the *habit of planning* is a developable habit.

The *social planning function* is inclusion in the curriculum of lessons and group exercises for producing consensus in planning ends and means of group Enterprises. A new factor appears in the social dimension of the planning function, and this factor is centered on the concept of consensus. *Consensus* is *unanimity of agreement or consent in a group of people*. Consensus is the antithesis of anti-social rulership and of the precepts of Taylorism.

4.4.3 The last pair of functions in persuasion education is comprised of the civics contracting function (in the personal dimension of the learner) and civil contracting function (in the social dimension of the learner). Both pertain to deontological ethics factors of *obligatio* (pledging) and *obligatione* (legal liability). There is an old saying, less commonly encountered these days, that goes, "A man's word is his bond." Although it might be that this aphorism evokes more cynicism than reflection in our times, it nevertheless touches a sensitive nerve in regard to the human nature of interpersonal relationships. To those with cynical regard for it, I quote Oscar Wilde's line, "A cynic is one who knows the price of everything and the value of nothing." But, lest it prove too tempting to over-romanticize this, I also add, "And a sentimentalist . . . is a man who sees an absurd value in everything and doesn't know the marketplace of any single thing."¹⁸

¹⁷ refer to the D-PIPOS circumplex model for Kiesler's operationalization expressions.

¹⁸ from Wilde's *Lady Windermere's Fan, III*.

The *civics contracting function* is inclusion in the curriculum of lessons of civic Duties of *obligatio interna* with consciousness of *obligatione externa*. The two Latin terms are technical terms in deontological ethics. *Obligatio interna* ("internal pledging") is a form of pledging in which pledger and pledgee are one and the same person. The matter-of-duty for *obligatio interna* is a duty-to-oneself and the obligation is an obligation-to-oneself. *Obligatio interna* is logically categorical and relates the specific duty to a Duty-to-Self with regard to one's personality. Persuasion education here pertains to the learner developing *Self*-persuasion by guided vocational orientations of his Obligations-to-himself with regard to his personality. *Obligatio externa* ("outward legal liability") is a legal liability the pledger willingly accepts by which: (1) he makes it his personal duty to commit to doing something at the choice of another person; and (2) he grants that other person and agents of the civil Community a warrant to compel his compliance in the event he refuses to carry out the duty to which he has pledged himself [Kant (*c.* 1784-85), 27: 260-274]. The contracting function mandates instructing the learner not only in his unalienated and alienated liberties but also Society's civil rights in regard to the learner's personal culpability for transgressions by specific actions his *natural* liberty permits him to take but his *civil* liberty does not.

The *civil contracting function* is inclusion in the curriculum of lessons of civil Duties and civil rights of *obligatio externa* with consciousness of *obligatione interna*. *Obligatio externa* ("outward pledging") is a form of pledging in which the pledgee is a person or group of persons other than the pledger. The matter-of-duty for *obligatio externa* is a duty-to-others with a reciprocal pledge from these others made to the pledger. *Obligatio externa* relates the specific duty to a Duty of the pledger with respect to the situation of the pledgee. This form is logically disjunctive, which means that determination of the pledger's duty is co-determined with a duty pledged to him, by the pledgee, that the pledger can compel the pledgee to fulfill in his turn.

Obligatio interna ("inner legal liability") is a liability a person *subjects himself to* but at the same time is linked to some duty to which he cannot be justly compelled against his consent by *another* person to perform. Such a duty is called an *imperfect duty* because the person cannot be legally compelled by another person to carry it out. A manifestation in experience of *obligatione interna* is encountered whenever a person suffers the sort of disturbance to equilibrium we often called an attack of conscience. The function teaches the deontological ethics of citizenship.

§ 5. Functions, Subject-Matters, and Courses

Before proceeding with the remaining chapters, it seems prudent to recapitulate a few points regarding the relationship between the functions just reviewed, subject-matters, and courses. The first point I wish to emphasize once more is that *the functions are not subject-matters and are not courses* in a curriculum. They are general objectives to be met by curricula and descriptions of tactical methods for cultivating the actualization of these objectives as learning outcomes. For example, to propose to set up a *course* in, say, "civil contracting" (or any of the other functions) is contrary to the applied metaphysic of public education and would be a serious error. The functions pertain to adaptations to be effected by means of instruction in the learner's practical manifold of rules and speculative manifold of concepts. These adaptations will not occur in the learner if the functions are presented to him in the abstract and without the use of actual exercises designed to evoke constructions in their manifolds. Although he wasn't, Dewey might just as well have been speaking of the functions of public instructional education when he wrote,

Without . . . formal education, it is not possible to transmit all the resources and achievements of a complex society [to its children]. It also opens a way to a kind of experience which would not be accessible to the young, if they were left to pick up their training in informal association with others, since books and the symbols of knowledge are

mastered.

But there are conspicuous dangers attendant upon the transition from indirect to formal education. Sharing in actual pursuit, whether directly or vicariously in play, is at least personal and vital. . . . Formal instruction, on the contrary, easily becomes remote and dead – abstract and bookish, to use the ordinary words of deprecation. What accumulated knowledge exists in low grade societies is at least put into practice; it is transmuted into character; it exists with the depth of meaning that attaches to its coming within urgent daily interests.

But in an advanced culture much which has to be learned is stored in symbols. It is far from translation into familiar acts and objects. . . . There is the standing danger that the material of formal instruction will be merely the subject matter of the schools, isolated from the subject matter of life-experience. [Dewey (1916), pg. 9]

Dewey did *not* say here to dispense with the 'formal and symbolic' – i.e., the 'academic' – in education. His point *is*, rephrased into the language of this treatise, that the formal and symbolic taught for itself and without regard for the mental physics and psychology of learning or the human nature of Societies will too often fail to achieve the Republic's goals of education.

The subject-matter of courses is only the *materia circa quam* of education, the matter around which instruction is weaved. The *materia in qua*, i.e. the goals, of *public* instructional education subsist in the twenty-four functions presented here. The courses themselves are only concrete and practically useful devices for improving and strengthening the *Personfähigkeit* of the learners. They *are to be designed* to simultaneously cultivate the learner's practical, intellectual, tangible, and persuasive powers *and* to instruct him in those special facts which are currently fecund for his successful integration into his social environment overall.

When a teacher is designing a course or choosing textual reference resources, a necessary part of the design task is to determine how to work into it as many of the functions as a social-natural science of education finds to be practicable. It is also a practical necessity that the functional lessons being conveyed are matched to the developmental stages and capacities of the learners. From the lowest to the highest rungs on the educational ladder, the twenty-four general functions of public instructional education must be seamlessly incorporated *into* the course design and specific subject-matter selection, methods of presentation, the writing of textbooks, and the ergonomic (human-natural) design of other supporting material.

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