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ABSTRACT

In this paper it is shown that one's conception of intelligence and its development profoundly affects the formulation of educational objectives. A mechanistic conception of intelligence leads to the definition of objectives as a collection of fragmented "cognitive skills" that have little to do with children's development of intelligence. A Piagetian conception, on the other hand, leads to attempts to develop children's intelligence as an organized whole. Intelligence is not something that we can educate separately by pasting it onto the child. It is rooted in the biological origins of a whole organism and develops as a highly interdependent whole. Our comprehension of reality, or the way in which we understand reality, precedes and largely determines how we react to it. Whatever specific objective we may define in education must, therefore, support and enhance qualities such as autonomy, so that intelligence can develop as a coherent, powerful whole. If we want this intelligence to develop into something powerful enough to overcome the natural human tendencies to see reality in terms of emotional needs and to accept easy ready--made answers, we must educate children to deal logically with reality itself. By compartmentalizing academic skills and separating them from the development of intelligence, schools too often produce passive students who wait to be told what to think next. (Author/JM)

One Intelligence Indivisible*

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The title of my address is inspired by the theme of this conference, "One Child Indivisible." It gives me an opportunity to express my growing concern about recent trends in curriculum and evaluation toward dividing intelligence into parts to be educated and evaluated separately. These trends can be seen in fragmentary or compartmentalized definitions of cognitive objectives such as "information-processing skills," which imply that information processing can be taught separately from other cognitive skills. Such a view now seems to be buttressed by the pseudo-scientific respectability of psychometric tests which define so-called "competencies" in criterion-referenced tests. I am very distressed by the halo put around these "competencies" by program evaluators who use them to show quantitatively how much children have learned.

I would like to show in this paper that one's conception of intelligence and its development profoundly affects the formulation of educational objectives. A mechanistic conception of intelligence leads to the definition of objectives as a collection of fragmented "cognitive skills" that have little to do with children's development of intelligence. A Piagetian conception, on the other hand, leads to attempts to develop children's intelligence as an organized whole.

Most people now recognize the futility of trying to stuff children's heads with

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*A revised version of one of the keynote addresses at the annual conference of the National Association for the Education of Young Children, November 25, 1974, in Washington, D. C. The author's work is supported by the Urban Education Research Program, College of Education, University of Illinois at Chicago Circle. The assistance of Rheta DeVries, also of UICC, is gratefully acknowledged.

encyclopedic facts. In turning from content to process, however, some educators came to view the mind more and more like a machine. This view is especially clear in the recent preoccupation with the teaching of "cognitive skills" and "concepts." The term "skill" is justifiable when it refers to motor skills, such as walking, penmanship, swimming, skiing, and typing which become more perfect with practice. However, I object strongly to the implication that the nature of intellectual learning is no different from the learning of motor skills. Motor skills can be developed by repetition and practice, but intelligence simply cannot be developed in these ways. Consider the following skills I found in one Head Start list of educational objectives:

Classification skills

Sensory skills

Attentional skills

Sequencing skills

Information processing skills

Basic learning skills

Basic conceptual skills

Abstracting and mediating skills.

If objectives are conceptualized in terms of such separate skills, it is no wonder that curriculum activities reflect the same fragmentation.

Closely related to the teaching of "cognitive skills" is the teaching of a collection of so-called concepts such as the following:

Three, five, and ten

Squares and circles

Red and blue

Big and little

Before and after

Over and under

In and out

On and off

Behind and in front of.

It is true that one can often teach children to understand and produce these words correctly. However, one cannot say that children learn number, classes, sizes, or spatial or temporal relationships by learning these words. In fact, if one is successful in teaching children these words, it is usually because they already know the relationship. The teaching of "concepts" is generally equated with the teaching of words. While I have nothing against the teaching of words, I do object to attempts to teach relationships by teaching a collection of words that are believed to add up to intellectual development.

Let me turn now to a specific example. Recently, I received an announcement of a test called the "Cognitive Skills Assessment Battery" (Boehm and Slater, probably 1974). The stated purpose of this test is curriculum planning for young children. One of the two items shown as examples of a competency worth teaching is the following: The child is shown a picture of some toys and a couple of chairs, and is told, "Here are some toys. Listen carefully. Show me the dog in the box and the doll on the chair." I fail completely to see the importance of being able to find in a picture the dog that is <u>in</u> the box and the doll that is <u>on</u> the chair. It is not by learning to decipher pictures and other symbols on paper that children become more competent intellectually.

Piaget's notion of intelligence is very different from the view of intelligence as a collection of specific skills and concepts. When he taught a course on intelligence, he began by asking what is meant by "intelligence." Like most teachers, he answered his own question by saying that, for him, "acts of intelligence" consist of "adaptation to new situations." He went on to say that, although intelligence enables us to adapt to new situations, situations are never entirely new, and we understand new ones in terms of the knowledge that we bring to them. There are thus two aspects in any act of intelligence: (1) the comprehension of the situation and (2) the invention of a solution based on how we comprehend the situation. In other words, our comprehension of reality, or the way in which we understand reality, precedes and largely determines how we adapt to it. A most important part of intelligence is, therefore, the ability to read reality, structure it, and get meaning out of what is observable. I think many educators are far too preoccupied with children's ability to manipulate symbols. I would like to see less worry about this and more worry about children's ability to read and structure reality in an intelligent way.

Let me discuss a classical Piagetian task to give an example of children's ability to read things from reality. The task I am referring to is known as "class inclusion." In this task, the child is given, for example, six blue blocks and two yellow ones as shown in Figure 1. He is first asked, "What do we call these?" so

Insert Figure 1 about here

that the examiner can proceed with whatever word came from the child's vocabulary. If he says, "blocks," he is asked to show all the blocks. The examiner then asks the child to show "all the blue blocks" and "all the yellow blocks." Only after making sure that the child understands the words "all the blocks," "all the blue blocks," and "all the yellow blocks" does the examiner ask the following question: "Are there more blue blocks or more blocks?" Five-year-olds typically answer, "More blue ones," whereupon the examiner asks, "Than what?" The 5-year-old's typical answer is "Than yellow ones." In other words, the question the examiner asks is "Are there more blue blocks or more blocks?" but the question the child "hears" is "Are there more blue blocks or more yellow ones?"

Children "hear" a question that is different from the question the adult asks because once they mentally cut the whole into two parts, the only thing they can think about is the two parts. For them, at that moment, the whole does not exist any longer. They can think about the whole, but not when they are thinking about the parts. In order to compare the whole with a part, the child has to mentally do two opposite things at the same time--cut the whole into two parts and put the parts back together into a whole. This is precisely what young children cannot do. This inability to think simultaneously about the whole and a part explains why, when they are asked, "Are there more blue blocks or more blocks?" the only "blocks" they can see while thinking about the blue ones are the yellow ones.

Note that the child has all the sensory information and all the language he needs to answer this question correctly. Yet the reality he <u>sees</u> is not the same reality that the adult sees. We never see reality as it is "out there" in the external world. We know it by assimilating it to the intelligence that we bring to each situation. Piaget coined the term "logicization" to refer ~~to~~ this process of putting observable elements of the external world into relationships. The blocks are all "out there" and can be observed both by children and adults. Yet, the logical relationships the child can construct by looking at the blocks are not the same logical relationships that the adult constructs.

I would like to discuss another famous task to illustrate what Piaget means by the logicization of reality. The task is known as the conservation of weight. When we show the 7-year-old child two clay balls of the same size (○ ○), roll one of them into a sausage (○ ⊂⊃), and ask him whether the ball has "the same amount" as the sausage, he is likely to say that, of course, the two have the same amount. When we ask him to explain his answer, he may shrug and say, "You didn't add anything or take anything away." If you then ask the child whether the two objects weigh the same, the 7-year-old usually says that the ball is heavier than the sausage! Note again that the child has all the observable information and all the language he needs to conclude that the two objects have the same weight. In fact, he even told the examiner, just before saying that the ball is heavier, that nothing has been added or taken away.

To explain what Piaget means by the logicization of reality in this context, I would like to discuss a fundamental distinction he made between physical knowledge and logico-mathematical knowledge. Physical knowledge is knowledge of objects that are "out there" and observable in the external world. In the conservation of weight task, for example, the color of the clay is "out there" in the object and is observable. The weight of the clay ball, too, is in the object and observable. Logico-mathematical knowledge, by contrast, consists of relationships created by the individual. The numerical relationship "two," for example, is neither in this object (○) nor in this object ( ), and if the individual could not put these objects into a relationship, the two would remain unrelated. While physical knowledge comes mainly from outside the individual, logico-mathematical knowledge is constructed by the individual from the inside. Other examples of relationships created by the individual are "the same size," "bigger than," "longer than," and "heavier than." The relationship "heavier than" is neither in this object (○) nor in this object ( ). This is a creation by the individual who puts observable things into a relationship.

What is the relationship between physical knowledge and logico-mathematical knowledge? Three characteristics of this relationship illustrate the indivisibility of intelligence. The first is the mutual dependence and inseparability of physical and logico-mathematical knowledge. Piaget believes that physical knowledge cannot exist without logico-mathematical knowledge, and that the converse is also true. For example, when we think about the physical property of an object, such as the color of a pen which is red, we can think about this redness only by putting it into a relationship with "things that are not red." Without this classificatory scheme, in other words, it would not be possible even to have the idea that the pen is red. The shape of the pen can likewise be observed only by putting it into a relationship with other shapes that are not long. If there were no network of relationships in the mind of the observer, each observation would remain isolated and unrelated to every other observation. There can thus be no physical, i.e., empirical, knowledge without a logico-mathematical framework. There would, likewise, be no logico-mathematical framework if there were no objects in the world for the child to put into relationships.

Secondly, the relationship between physical and logico-mathematical knowledge is characterized by circular causality, in which the development of one contributes to the development of the other, and this development, in turn, contributes back to the first, and so forth in a continuous way from birth to adulthood. In other words, the better an individual can structure logico-mathematical relationships, the better he can read from reality whatever is observable.

Thirdly, knowledge begins in infancy mainly as physical knowledge, and the role of logico-mathematical knowledge becomes increasingly greater as the child becomes capable of concrete and formal operations. Babies and very young children spend most of their waking hours acting on objects to find out their physical properties. They examine everything in sight by turning them over, putting them in their mouths, squeezing them, dropping them, and so on, to find out about their properties. To put this development in anthropomorphic terms, logico-mathematical knowledge has a "tough row to hoe" because it comes into existence later than physical, i.e., empirical, knowledge, and has to subjugate it by logicizing it.

Let us return to the time lag between the conservation of amount of clay and the conservation of weight to illustrate the difficulty the child has in logicizing his physical, empirical knowledge. The size of the clay is visible, and therefore amount is easier to put into a logical relationship than weight. Since weight is invisible, the only way the child can observe it is by holding it and feeling its weight. When the 7-year-old compares the weight of the clay ball with that of the sausage, he usually compares the <u>pressure</u> exerted at the one point of contact between the ball and the table with the pressure that is distributed all the way along the bottom of the sausage. He thus confuses the <u>weight</u> of the object with the <u>pressure</u> he would feel if the table were his hand. This is why he says that the ball is heavier than the sausage, even though he knows that nothing has been added or taken away. Since weight is much harder to logicize than amount, the child can think of amount of clay in logico-mathematical terms, but he continues to think about the weight of clay in physical terms. In other words, the 7-year-old's logico-mathematical framework is powerful enough to logicize visible amounts, but not powerful enough to logicize the invisible weight. Even adults can be found in situations where their logic is not powerful enough to be rational, especially when emotions and social pressures are involved. Politicians are particularly good at using emotional appeals to influence our evaluation of facts and sway our opinions.

So far, I have been talking about children's ideas about very intellectual things, such as class inclusion and the conservation of weight. What about more mundane things such as children's notions of "sisters," "mothers," and "grandmothers"? In the following exerpt from <u>The Child's Conception of Time</u>, Piaget (1946) was interviewing a four-and-a-half-year-old who had a younger sister. He asked:

> Who is the older of you two? <u>Me</u>. Why? <u>Because I'm the bigger one</u>. Who will be older when she starts going to school? <u>Don't know</u>. When you are grown up, will one of you be older than the other? . . . <u>Don't know</u>.

Is your mother older than you? Yes. Is your Granny older than your mother? No. Are they the same age? I think so. Isn't she older than your mother? Oh no. Does your Granny grow older every year? She stays the same. And your mother? She stays the same as well. And you? No, I get older. And your little sister? Yes! (categorically) (p. 221).

Note that there was a consistently good empirical reason for everything this child said. She believed that her grandmother was no older than her mother because the two were the same size. She also believed that neither was growing older because they did not become bigger. The child indeed had some notion of time, but it was all related to observable phenomena. Her time was not structured to the point of being a deductive system. Thus, the child could not deduce that the interval between her age and her sister's age would always remain the same. This is an example of how "simple" concepts like "sister," "mother," and "grandmother" are in fact extremely complex because they depend on children's structuring of logical, deductive systems. The intelligence that constructs all these interdependent notions is simply not a collection of separate cognitive fragments.

I have attempted so far to argue that intelligence is a highly interrelated network of concepts and relationships which develops as an indivisible whole. This development takes place not only indivisibly but also inseparably from the child's social and moral development because the child uses the same intelligence in making social and moral judgments. I would like to cite a few examples from The Moral Judgment of the Child (Piaget, 1932) to support this point. Piaget asked children which act was the naughtier of two acts of breaking things: breaking 15 cups by flinging open a door without knowing that a trayful of cups was behind the door, or breaking only one cup while getting something that one is not supposed to get? Six-year-olds tended to say that it is worse to break 15 cups unintentionally than to break one cup while intentionally committing a no-no. Older children, on the other hand, tended to say that intention is what counts in questions concerning morality. Young children here again showed the same way of making judgments on the basis of what is observable. The way young children read reality and get meaning out of it is simply not the same as older children's way of reading reality. This ability to read reality is simply not a collection of cognitive skills. Older children assimilate the reality of broken cups into a network of relationships such as the context within which the breakage occurred and whether there were any attenuating circumstances.

What about children's ideas about lies? Piaget made up pairs of stories and asked children which of the two lies was the worse. Here is an example of a story.

> A little boy (or a little girl) goes for a walk in the street and meets a dog who frightens him very much. So then he goes home and tells his mother he has seen a dog that was as big as a cow (p. 148).

The second story was:

> A child comes home from school and tells his mother that the teacher had given him good marks, but it was not true; the teacher had given him no marks at all, either good or bad. Then his mother was very pleased and rewarded him (p. 148).

Six-year-olds tended to say that it is worse to say, "I saw a dog as big as a cow." Why? Because dogs are never as big as cows, and mothers do not believe such statements! In other words, for 6-year-olds, the more the lie deviates from what is plausible, the less believable it is, and the worse it is, because the greater the likelihood of punishment. Older children, in contrast, invoke the same empirical facts to support the opposite opinion. For them, the more believable the lie is, the worse it is <u>because</u> other people believe it. Given exactly the same external reality, young children read different "facts" from reality. BEST COPY AVAILABLE

If you are saying to yourself that young children say the cute things they say only because they have not had all the "experience" of an adult, I would like to mention the attempts to cover up the Watergate affair. This is an example of how acts of intelligence are determined largely by how people understand a situation. Having read reality in a certain way, Mr. Nixon and his associates adapted to their reality as they understood their reality. These are highly intelligent people who were intelligent enough to get through law school and rise to power and wealth. Yet, their desires, ambitions, and social relationships reduced their ability to read reality to the point of lying in ways that were scarcely less transparent than the lies of 4-year-olds.

If intelligence develops as an indivisible whole, and this development is inseparable from social and moral development, the objectives of early childhood education must be formulated in terms of development as a whole. This formulation is in contrast with lists of specific objectives, such as the ability to show "the dog in the box and the doll on the chair." It is also in sharp contrast with the objective of "success in school." "Success in school" and "intellectual and moral development for adaptation to the reality of adult life" are not mutually exclusive, but they overlap only partially as can be seen in the intersection of the two circles in Figure 2.

Insert Figure 2 about here

The part of "success in school" which does not overlap with "development" includes all the things we memorized just to succeed in school. We can all remember memorizing lots of irrelevant words we did not understand or care about, just to pass one test after another. To quote Piaget (1972), "Everybody knows how little remains of the knowledge acquired in school, five, ten, or twenty years after the end of secondary schools (p. 88)." This problem continues to be a very serious one, especially for compensatory education programs such as Head Start and Follow Through, whose perspective is limited to short-term adaptation to traditional schools.

The part of "development" in Figure 2 which does not overlap with "success in school" refers to the social, moral, and intellectual development which takes place outside the school or, sometimes, in spite of schools. It is sad to note that formal operations and a high level of moral development are not always found among university students. Piaget (1972, p. 51) observes that when we look at normal adults, we are forced to conclude that people who are masters of their reason are as rare as people who are truly moral.

If we take intellectual, social, and moral development as our long-range goal (the circle on the left in Figure 2), how can we define short-range objectives for early childhood education? Many of you have already heard me objecting to my earlier juxtaposed conceptualization that circulated most widely in the Handbook on Formative and Summative Evaluation (Kamii, 1971). In that book I delineated educational objectives by juxtaposing socio-emotional and cognitive objectives as shown in Figure 3. Within the socio-emotional realm, I further juxtaposed a

Insert Figure 3 about here

variety of objectives that I now prefer not to recall. Within the cognitive realm, too, I juxtaposed all the areas of knowledge studied by Piaget, e.g., classification, seriation, number, space, time, physical knowledge, etc. In retrospect, this was an empiricist-mechanistic assimilation of Piaget's theory and a distortion of it. I subsequently found out that, in the psychological reality of the child, classification, seriation, number, physical knowledge, etc., are related not in this neat, mutually exclusive way as shown in this itemized list, but, rather, in the messy, inseparable way shown in Figure 4.

Insert Figure 4 about here

My colleagues and I nowadays define educational objectives by putting these co nitive objectives within the context of socio-emotional objectives as shown in Figure 5. Since the child's social and moral development is beyond the scope of this paper, I would like to limit the rest of the discussion to the reason for

Insert Figure 5 about here

putting cognitive objectives in the following socio-emotional context:

Curiosity and initiative in pursuing curiosities

Alertness in putting things into relationships

Confidence to figure things out

Confidence to speak one's mind with conviction

Autonomy and ability to resist what does not make sense

Openness to consider different points of view.

This list may seem to some like a set of arbitrary values pulled out of what Kohlberg and Mayer (1972) call "a bag of virtues." While I agree that curiosity, alertness, confidence, and open-mindedness are highly valued in our culture, it is not for this reason that I consider them important educational objectives. My reason for valuing curiosity, alertness, etc., is that, without these, according to Piaget, human intelligence cannot develop. If intelligence develops as a whole by the child's own construction, then what makes this construction possible is the child's curiosity, interest, alertness, desire to communicate and exchange points of view, and a desire to make sense out of it all. Anyone who watches babies in light of The Origins of Intelligence (Piaget, 1936) and The Construction of Reality in the Child (Piaget, 1937) becomes convinced that curiosity, initiative, and alertness are what enable them to build all of their sensory-motor intelligence, which is truly a vast amount of knowledge. If curiosity, initiative, and alertness are present in young children, the rest of what are too often found in lists of cognitive objectives, such as "red" and "blue," are bound to be learned incidentally.

Logico-mathematical knowledge is especially dependent on the child's initiative, since it develops by the child's own creation and coordination of relationships. Logico-mathematical objectives are, therefore, better formulated in terms of encouraging the child's alertness than in terms of developing his "skills" such as "classification skills." The following example illustrates this point. A group of 4-year-olds went on a walk one day when there were many puddles on the ground. The teacher cautioned the children by saying, "Anyone who steps in a puddle is a wet noodle." The next day was very cold, and the puddles were half frozen. When the group went outside again, one of the children said, "Anyone who steps in the ice is a frozen noodle!" This remark was typical of this alert child, who came up with similar statements all the time. Alert children thus think of relationships that do not even occur to adults. The child's alertness is, therefore, a richer, more fruitful objective than a list of preconceived "skills." While structuring the observable data in his reality, this child was perfecting his classificatory scheme of "a puddle is to an icy puddle, what a wet noodle is to a frozen noodle."*

In conclusion, I would like to refer back to the examples given earlier of class

*Those who are interested in an explanation of the rest of the objectives listed above are referred to Kamii and DeVries (in press).

inclusion, the conservation of weight, children's notions of "sister," "mother," and "grandmother," their moral judgments about breaking things and telling lies, and Mr. Nixon and his associates. Intelligence is not something that we can educate separately by pasting it onto the child. It is rooted in the biological origins of a whole organism and develops as a highly interdependent whole. To cite Piaget once again, our comprehension of reality, or the way in which we understand reality, precedes and largely determines how we react to it. Whatever specific objective we may define in education must, therefore, support and enhance qualities such as autonomy, so that intelligence can develop as a coherent, powerful whole. If we want this intelligence to develop into something powerful enough to overcome the natural human tendencies to see reality in terms of emotional needs and to accept easy ready-made answers, we must educate children to deal logically with reality itself. By compartmentalizing academic skills and separating them from the development of intelligence, schools too often produce passive students who wait to be told what to think next. Evaluators have been busy evaluating all kinds of things, but what they have yet to evaluate is the conceptualization of objectives from the standpoint of how human intelligence develops.

References

Boehm, A. E., & Slater, B. R. Cognitive skills assessment battery. New York: Teachers College Press, probably 1974.

Kamii, C. Evaluation of learning in preschool education: Socio-emotional, perceptual-motor, cognitive development. In B. Bloom, J. Hastings, & G. Madaus (Eds.), Handbook on formative and summative evaluation of student learning. New York: McGraw-Hill, 1971.

Kamii, C., & DeVries, R. Piaget for early education. In M. C. Day & R. K. Parker (Eds.), The preschool in action (2nd ed.). Boston: Allyn and Bacon, in press.

Kohlberg, L., & Mayer, R. Development as the aim of education. Harvard Educational Review, 1972, 42, 449-498.

Piaget, J. The origins of intelligence in children. New York: International Universities Press, 1952. (First published . as La naissance de l'intelligence chez l'enfant. Neuchâtel: Delachaux et Niestlé, 1936.)

Piaget, J. The construction of reality in the child. New York: Basic Books, 1954. (First published as La construction du réel chez l'enfant. Neuchâtel: Delachaux et Niestlé, 1937.)

Piaget, J. The moral judgment of the child. New York: The Free Press, 1965. (First published as Le jugement moral chez l'enfant. Paris: Alcan, 1932.)

Piaget, J. The child's conception of time. New York: Ballantine Books, 1971. (First published as Le développement de la notion de temps chez l'enfant. Paris: Presses Universitaires de France, 1946.)

Piaget, J. Où va l'éducation? Paris: Denoël, 1972.

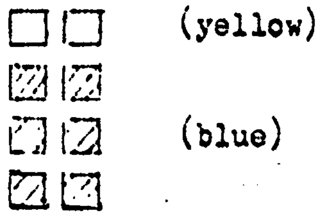

Figure 1. The arrangement of blocks in the class-inclusion task.

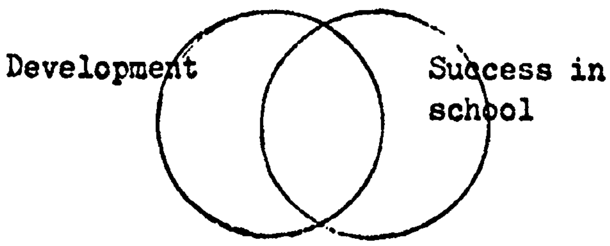

Figure 2. The relationship between two conceptions of objectives.

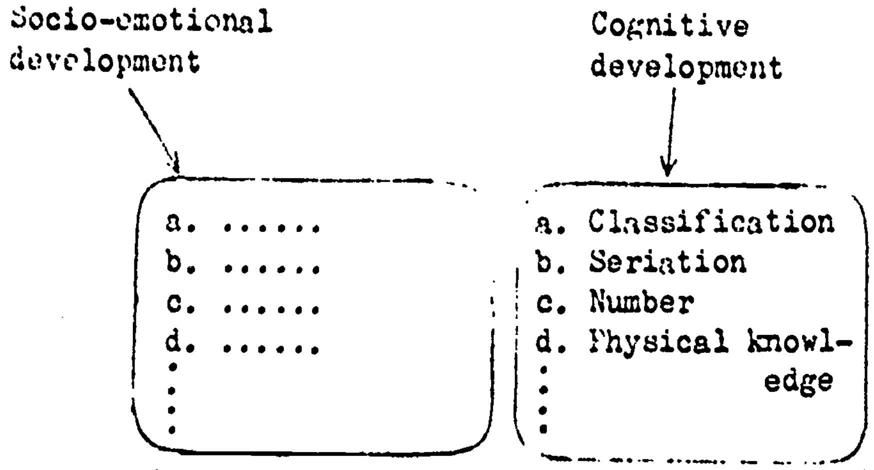

Figure 3. The juxtaposition of socio-emotional and cognitive objectives.

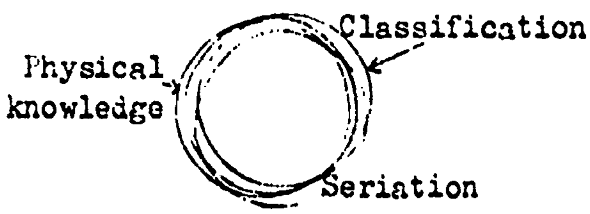

Figure 4. The areas of cognition studied by Piaget.

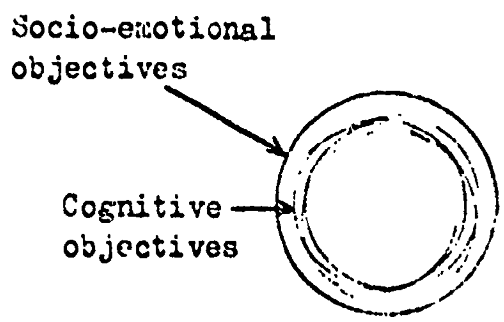

Figure 5. The definition of cognitive objectives in the context of socio-emotional ones.