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About the Journal

The Constructivist, the official journal of the Association for Constructivist Teaching (A.C.T.), suspended online publication during the COVID pandemic. We return to carry on traditions and introduce innovations.

The Constructivist is an online journal, available to members of A.C.T., others involved in educational endeavors, and the public. We hope it will be a catalyst for broader discussion of educational issues, looking beyond the standards-testing-accountability paradigm. It will feature constructivist perspectives, including the influences of Dewey, Piaget, and Vygotsky, as well as other student-centered and progressive approaches to education.

The journal will attempt to serve as a bridge between academics and practitioners, including classroom teachers, school administrators, and those involved in shaping policy. These have tended to be separate camps, each leery of the other, with uneasy communications between them. *The Constructivist* offers a forum that respects perspectives derived from differing daily responsibilities. It seeks to be a meeting place where common “language” can be constructed in the process of ongoing communication with each other. And we hope that new questions and answers will emerge from the discourse.

Please help to broaden the discourse by distributing the link to this journal.

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From the Editors

You may appreciate that each piece in this issue was selected to bridge theory and practice. A common thread throughout this issue is learners constructing something: a way to solve a math problem, a tower hung from the ceiling, a paper water lily, a project of their own, or a disposition toward kindness awakened through making clothing. The authors ask what learners come to understand as they construct and what teachers do to make room for this type of learning.

This issue opens with a paper that nearly went unpublished. Daniel Miltner, a graduate student of Joe Becker at the University of Illinois at Chicago, wrote *Teacher Difficulties When Students Bring Their Own Solutions into the Classroom* before he passed away. Joe was preparing it for publication when we lost him, too. The paper stands as the lead article, both for its merits and in remembrance of their good work. Miltner asks what it takes for a teacher to welcome a child's own way of solving a problem. Through interviews with beginning teachers, he shows where that gets hard: valuing a method unlike one's own, helping classmates make sense of it, and staying flexible about what mathematical symbols can mean.

Christine Chaillé has us revisit Piaget's concept of adaptation in *Can Theory Give Us Hope and Inspiration? A New Look at "Adaptation."* The content of this piece was well received at the 2025 A.C.T. conference, and we are glad she extended it for this issue. She watches five-year-old Mark as he works out how to build down from a block hung from the ceiling and sees more than a problem solved. Adaptation, she argues, is not fitting ourselves to the world as it is; it is how children, and all of us, go beyond it. In unsettled times she finds hope there, and in the work teachers do to give children that chance.

Brian Stone and Jessica Beekman take stock in *The State of Projects in the Elementary School Classroom: A Constructivist Perspective*. The authors point out that "project" is painted with a broad brush, capturing almost anything a class does, from cut-and-paste to open inquiry. Too often, they argue, students are offered little to no agency, with learning outcomes dictated by the standards and driven by the teacher. They weigh today's leading frameworks against constructivist principles for learning and propose a framework called Dynamic Projects, where the work belongs to the students.

Anne Lowry brings us into her PreK classroom in *Making as Learning*, where four- and five-year-olds build with paper, cardboard, sewing equipment, and a little metalworking. She is guided by the pedagogy embodied in Giambattista Vico's sentiment, "We only know what we create." In her classroom, a paper water lily becomes a study of how living things move fluidly; a cardboard house becomes a neighborhood accompanied by questions about roads and land use. Her students come to know themselves as questioners and learners, and Lowry invites us to make things in our own classrooms.

Randa Dunlap and Teresa Sumrall describe a two-month project in *A Coat of Many Colors: The Construction of Clothing in a Multi-age Preschool Classroom*. This work began when a new teacher noticed the children's interest in dress-up clothes and read them Dolly Parton's *Coat of Many Colors*, wondering whether making clothing could also teach empathy. The children took up both the sewing and the question of kindness. To us, this inquiry shows what can happen when a teacher brings her own heart to what children are curious about.

David Kritter & James Foss

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The Constructivist is an open-access journal published by the Association for Constructivist Teaching. Submit articles to James Foss, fossj@umn.edu; submission guidelines appear on page 55. The Constructivist is intended for preschool, elementary, secondary, and post-secondary educators who are striving to apply constructivist principles for learning to the classroom. Authors retain copyright of their articles. Please respect intellectual property and use standard citations (e.g., APA style) when referring to ideas expressed in the journal. ISSN 1091-4072 (print). USE OF CONTENTS BY AI SYSTEMS IS PROHIBITED.

Teacher Difficulties When Students Bring Their Own Solutions into the Classroom

Daniel Miltner

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Current mathematics curricula often direct teachers to focus upon a single preferred method, a traditional algorithm, to solve particular types of problems. These methods are often taught by demonstrating them and walking students through a step-by-step procedure. Often these are the only methods that the teacher acknowledges in class. In contrast, constructivist emphasis on recognizing a variety of paths to solution puts a different responsibility on teachers. Not only do teachers need to know how to do the problem for themselves, they also need to actively follow the various ways their students are thinking. Teachers are expected to understand students' problem-solving approaches in ways that they may not have thought about before, and in situations where they may not have time or the patience to fully process a student's thought process.

The constructivist tradition of such concerns includes the writings of Eleanor Duckworth (1972/2006) and emissaries of the Reggio Emilia approach (e.g., Edwards, Gandini, & Forman 1993/2011, among others). These concerns have had some impact on mainstream mathematics education, although currently the pendulum has swung toward standards and accountability. Still, at least lip service is paid to children's initial understandings in many public-school classrooms. The problem remains that many teachers who are aware of the desirability of such approaches have difficulty implementing them in practice.

The National Council of Teachers of Mathematics (NCTM, 2000) asserted, "The importance of using multiple representations should be emphasized throughout students' mathematical education" (p. 69). NCTM devoted their 2001 yearbook, *The Roles of Representations in School Mathematics* (Cuoco & Cuoco, 2001), to different ways that students build mathematical representations.

Lampert (2001) provided a detailed and insightful tapestry of classroom activity in which this emphasis is fully honored. However, Lampert is an experienced teacher and researcher, with deep mathematical knowledge, and less experienced teachers in classroom settings might find it difficult to relate effectively to their students' own solution methods. It is useful and important to discuss difficulties that less experienced teachers may face. For this purpose, scenarios were designed, based on extensive classroom observations. Teacher candidates in an alternative certification program, who were just beginning their classroom teaching in elementary schools, were interviewed using these scenarios. Their responses yield detailed examples of their *difficulties when students present their own solution methods* to the class.

Students' methods may be distinguished by whether or not they directly address a problem solution. Take for example, the following problem: "*Pat has 6 cookies. How many more cookies does he need to get to have 14 altogether?*" A student might successfully solve the problem in two ways. One way counts up from 6 to find the answer to "6 plus what equals 14." This solution method is an analogue of the situation in the problem. Another path to solution is to subtract 6 from 14. This solution method does not directly correspond to the situation in the problem. When a student offers a solution that does not directly reflect the problem situation, it is more likely that others in the class will be confused. The interview and the examples selected from them for this paper focus on such situations.

Difficulty in Valuing Students' Solution Methods

A teacher may understand a student's solution method, see that it is logical and that it gives the correct answer, and also have insight into why it is attractive to the student. However, this by itself may still not fulfill the vision of constructivist education. The teacher may not value the method and may not feel comfortable with the student using it. Consider Nick's response to the following scenario:

Janelle had 18 cookies. If her mom gave her 8 more, how many cookies does she have?

One student presented the following solution:

$$18 + 2 = 20$$

$$20 + 8 = 28$$

$$28 - 2 = 26$$

So my answer is 26.

Students in the class look confused. How would you respond? Note that the student's solution method deviates from the situation given in the problem. The addition of 2 and the compensatory subtraction of 2 do not follow the action (addition of 8) described in the problem. Thus, it represents a deviation from the problem as given – one initiated by the student. Research indicates that students reason in this way when they are encouraged to use their own solution methods (Resnick, 1992).

Nick, a teacher candidate, takes an uninterrupted 4 minutes and 53 seconds in his response. He has a tough time accepting and legitimizing the student's reasoning because of how it differs from the way he would do the problem. Nick goes back and forth between explaining the cleverness of the student's solution method and devaluing the method offered.

Nick first considers the student's method to be "a roundabout way to go about things." Then he wins more insight into the advantages of the student's reasoning, remarking, "She's got an even round number like 20...and then she comes up with 20 + 8...it's gonna be easy for [her] in [her] head...and then 28-2, that's not too hard."

However, he still is not comfortable with this way of solving the problem, “But, boy, sometimes I think the old algorithms are a whole lot easier.” Next, he notes that the student’s method “avoids the carrying totally...which for some kids that may be the way to do it.” He ends up by declaring that he is not reconciled to the student’s method: “boy, I couldn’t do it that way.”

Nick understands that the student’s solution method avoids the carrying (also termed regrouping, which emphasizes the place-value reasoning involved) and even that this may be desirable for the student. Yet this does not allow Nick to move away from the traditional algorithm and welcome the student’s reasoning. Even though he analyzes and comes to understand the student’s method, Nick seems reluctant to accept this solution as legitimate. He does not appreciate the student’s reasoning as an *elegant* and *creative* way to solve the problem without regrouping. Indeed, Nick clearly expresses a somewhat negative evaluation of the student’s reasoning. It seems that his own preference gets in the way of a fuller appreciation of the value of the student’s reasoning.

Difficulty in Explaining Students’ Solution Methods

When a teacher encourages students to present their own solution methods, the various methods presented by the students may be at different levels of mathematical sophistication. The teacher may have difficulty helping students who are confused to understand the method offered by one of their peers. Consider Susan’s (another teacher candidate) responses to the scenario used as an example at the beginning of this paper:

“Pat has 6 cookies. How many more cookies does he need to have 14 altogether?”

One student solves the problem by doing $14 - 6 = 8$.

Some students in the class look confused. How would you respond?”

Again, note that the student’s solution method does not directly correspond to the situation in the problem. The most direct way to represent the given problem situation mathematically would be to add-on to 6, stopping when getting to 14, by counting 7, 8, 9, ...14. Students first solve such problems by methods that directly represent the situation in just that way (Carpenter, Fennema, Franke, Levi, & Empson, 1999) – even though they use subtraction when that operation mirrors other problems (e.g., to solve the problem: *Pat has 14 cookies. She gave 6 to her friend. How many cookies does she have left?*) thus, there are likely to be children in the class who will be confused by the solution method presented in the scenario.

Susan responds to the scenario by representing the situation pictorially. First, she divides the problem into the “start” and “end” situations, writing the column headings with a large space in between. She represents the “start” situation by drawing 6 cookies. She follows this by representing the “end” situation by drawing the 14 cookies. Next, Susan says that there is something happening in between the “start” and “end” and labels the column “what happened.” She then draws in the 8 cookies in the column labeled “what happened in between.”

Figure 1

Susan's Pictorial Representation of the Cookie Problem.

<u>START</u>	<u>WHAT HAPPENED</u>	<u>END</u>
OOO	OOO	OOO
OOO	OOO	OOO
	OO	OOO
		OOO
		OO

Note. Each O represents one cookie: 6 at the start, 8 added, and 14 at the end. The rows of three are for ease of counting.

A major point here is that although Susan presents a justification that 8 is the right answer, she does not elaborate on how subtraction relates to the problem. For example, she could have achieved this by circling the top 6 cookies in the end situation, and explaining that counting the rest would tell us how many more cookies were added. In this way, students would have more of an opportunity to see that subtraction related to the given problem situation.

In response to how she would connect her representation with the solution offered by the student in the scenario, Susan notes that the student's solution goes "backward." The student's equation begins (on the left-hand side) with the end situation (the total of 14), whereas the problem as given in the scenario begins with Pat's initial quantity of 6 cookies. This is the specific way that the student's solution does not directly represent the given problem situation, and Susan clearly is aware of this issue. However, Susan's fluency in reversing the problem situation makes it difficult for her to see that she has not helped the confused students much in seeing the validity of using subtraction in this case.

Additional evidence that Susan's fluency in reversing the problem situation can make for difficulties may be seen in what happens next. Susan labels the "- 6" in the student's equation (seen below as "what happened") and labels the answer of 8 (on the right-hand side) as "start." At this point any student who is beginning to see that the given addition situation can be formulated in terms of subtraction may well become again confused since Susan has mislabeled the latter two parts of the equation.

Figure 2

Susan's labels for the Students Equation

$$14 - 6 = 8$$

$$14 \text{ (endpoint)} - 6 \text{ (what happened)} = 8 \text{ (starting point)}$$

Susan's mistake, although unfortunate in terms of her pedagogical aims, may still seem rather uninteresting conceptually, and not merit any particular attention. We might think the lesson is simply one of how important it is to keep focused and attentive to details. While these are certainly important issues, it is possible to see this slip emanating from Susan's fluency in reversing the problem situation. This fluency derives from a strong part-whole structure linking 14, 6, and 8. This makes it particularly easy for her to interchange the functions of the quantities of 6 and 8 in the problem to give the whole 14. Thus, the teacher's more developed part-whole understanding, and fluent movement between different symbolic representations, can actually get in the way of good communication and clear explanation that she seeks to give her students.

Difficulty Regarding the Use of Conventional Notation

In the first two examples, the issue is primarily pedagogical. The adequacy of the teacher's mathematical knowledge is not in question. However, at times dealing with multiple solution methods can bring out subtle misunderstandings concerning the conventions of our symbol system for arithmetic.

Part of the power of our symbol system is that it allows us to use different mathematical operations for the same problem situation. In the previous example, we saw that subtraction can be used for the situation in which Pat has 6 cookies and we are asked to figure out how many more he needs to end up with 14 altogether – even though this is most directly represented using addition. In other words, this problem shows that subtraction can be used not only for problems that involve decreasing a quantity, but also for problems that involve increasing a quantity. In similar fashion, symbolic expression of division, such as $6 \div 3$, can represent two distinct problem situations – 6 items distributed among 3 people, 2 per person (partitive division or fair sharing; depicted as OO OO OO), or 6 items distributed in groups of 3, to each of 2 people (quotative division or equal grouping; depicted as OOO OOO).

In the previous example, we saw that the teacher candidate's fluency in applying subtraction to a problem situation that is more closely represented by addition can hinder the teacher candidate from staying attentive to the problem situation and talking about it in a way the student understands. In contrast, the following example illustrates a teacher candidate's limited interpretation of the student's symbolic expression of division, despite a sophisticated grasp of two different situations. Consider Michael's (a teaching candidate) response to the scenario:

"Cara has 6 cookies. She wanted to divide them equally among 3 friends.

One student comes to the board and says:

'It is $6 \div 3$ ' and draws the following

OOO OOO

He says the answer is 2. Some students in the class look confused. How would you respond?"

Note that here the diagram the student draws is a valid way of determining that $6 \div 3 = 2$. However, it does not relate in a direct way to the given problem situation. A direct way to represent distribution to three people would be: OO OO OO.

Michael's response is sophisticated in two significant respects. First, Michael suggests that the student initially represents the problem as $6 \div 3$. Then the student presents a pictorial representation of the symbolic expression without regard to whether that picture directly corresponds to the problem. Michael clearly has considerable insight into how the student might come to offer the solution that he does. Second, Michael shows a full grasp of the fact that the pictorial representation OOO OOO *can* be seen as relevant for the given problem situation. He notes that the first O in each group can represent the cookies for one of the friends, the second O in each group can represent the cookies for the second friend, and the third O in each group the cookies for the third friend. Michael also indicated that he did not think that the student saw this way of fitting the pictorial representation OOO OOO to the problem situation.

However, when further considering how he would deal with this situation in a class, Michael indicates a strong bias about the meaning of the symbolic expression $6 \div 3$. He says, "I think ultimately, conceptually the 3 groups of 2 (referring to OO OO OO) is what you want the students to think about more routinely. This (referring to OOO OOO) is in my mind $6 \div 2$." Thus, Michael's dissatisfaction with the student's solution presented in the scenario is not just that the pictorial representation only fits with the given problem situation in a complicated and indirect way (which is unlikely to be known by students in a class doing this kind of simple problem). In Michael's view there is an inconsistency between the symbolic and pictorial representations given by the student.

Michael's case shows how misunderstandings of the meanings and uses of symbolic expressions can be introduced into elementary school teaching if we are not careful. The student might have been thinking of first giving one cookie to each person, and then distributing the remaining cookies (like dealing cards). This is not an incorrect conceptualization, but the symbolic representation of two groups of three is confusing. Surely, we need to work towards helping elementary school students understand the full meaning and use of such symbolic expressions. Therefore, we must consider these issues as part of our efforts to prepare teacher candidates to deal well with situations likely to arise in classrooms where a variety of solution methods are presented and discussed.

Conclusion

This paper identifies three specific difficulties that teachers encounter when they deal with students' solution methods that do not directly correspond to the situation in the problem. In one case, a teacher had difficulty valuing a student's solution method, even

though he saw its advantages, because of his own bias to solve the problem in a particular way. In another case, we saw how a teacher's own mathematical fluency led to possible confusion as she attempted to connect a solution method that directly aligns with the presentation of the problem (more accessible to other students) to the alternate solution offered by a student. And finally, we saw how a teacher's misunderstandings of the symbolic expression of division influenced his response to a student's solution method that did not directly reflect the situation in the problem.

Teachers should encourage students to construct and present their own solution methods in the classroom. Teachers serve as mediators between a student offering their own solution method and the rest of the class. Accordingly, they will be called to 1) appreciate the legitimacy of students' methods, despite the deviation from standard algorithms; 2) recognize that their own fluency in mathematics may cause unexpected confusion for students; and 3) seek opportunities to adapt their own understanding of symbolic expression. Each of these can be critical to teachers' success in dealing with students' personal solution methods.

Teachers' acceptance of multiple solution methods should be accompanied by an appreciation of the complexities that arise. Examination of teacher responses to episodes where multiple solution methods are used is offered as a first step in better supporting teachers. Teachers must understand the rationality of various approaches to problem solution. This will allow teachers, as Duckworth (1972/2006) suggests, to appreciate their students' thought processes as a vital step in guiding them to also understand the preferred paths to solution that are more readily acknowledged in the present school context, with its focus on direct instruction of representations of problem spaces as conceived by experts. The better process is to work from student understandings and help them to develop deeper understandings over time. For their part, teachers should also work toward more flexible understandings.

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A Special Note of Remembrance

The lead article for this issue was written by Daniel Miltner, a former graduate student of Joe Becker. When I first decided to take on the co-editorship of this journal, I had a discussion with Joe, who remembered this unpublished paper by a promising scholar who had died. We spoke about it and I encouraged Joe to edit the paper for publication. Joe sent me a draft shortly before his sudden and unexpected death. I completed the editing, with additional suggestions by my co-editor, with the goal of only minimal changes to the original.

This paper found a “sweet spot” where concerns of a researcher and practitioners overlapped. And it is especially pertinent to teacher education. These qualities suggested that it should be the lead article in this issue, serving as both an inspiration to all of us and as a remembrance of both Daniel Miltner and Joe Becker.

Joe Becker was a scientist and theorist, probing and analytic in his approach to a variety of issues in Psychology and Education. He was also a close and very caring friend. We met when I was a graduate student and he was a post-doc at the CUNY Graduate Center, working with Harry Beilin and Geoffrey Saxe. Joe continued as a post-doc with Geoff when he left to take a position at UCLA. Despite being at two of the most distant points in the continental U.S., New York and Los Angeles, our friendship grew over the years, and for that I am thankful.

His professorial career at the University of Illinois at Chicago focused on the development of scientific and mathematical reasoning in children. In later years especially, Joe’s approach to major issues in the field often challenged what most everyone else accepted. He examined the mind-body problem and consciousness, as well as aspects of systems theory.

In the months prior to his death, he was working on a paper that further examined an assumption of constructivist theory that we all have been taught but few have examined – that felt perturbations are the cause of development of new cognitive structures.

When we discussed these and other issues, we disagreed as often as we agreed, but I appreciated the intellectual jousting; it continued for a substantial part of our friendship over more than 40 years. One memory stands out for me. Joe flew from Chicago to New York when my wife, a cancer patient, was in the hospital, despite it being at a time when the COVID pandemic was in full force. My wife suggested this is how I should end this remembrance. It illustrates that, in addition to his probing intelligence, he was a good man.

David Kritt

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Can Theory Give Us Hope and Inspiration? A New Look at “Adaptation”

Christine Chaillé

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Throughout my career I have focused on educational practice, and the complex relationships between theory and practice - how theory informs practice in meaningful ways, and how practice motivates us to seek understanding in theory. Recently I have been compelled to revisit the theoretical concept of ***adaptation***, a key element of Piaget’s theory that I studied in the early years of my career. In the process I have reaffirmed my belief in the importance of theory in provoking our thinking about our work with children, as well as our professional identities. Unexpectedly, this has led me to feel renewed hope for the future in the face of dystopia.

The Context: Thinking About Continuity vs. Discontinuity, and the Consequences of Disequilibrium

In a recent discussion with colleagues, we were talking about how in some schools an effort is made to keep young children together with the same teacher throughout some of their infant/toddler, preschool or elementary education years, which is called “looping.” There are many arguments in favor of the practice. Teachers and children can build deeper relationships over time. Familiarity, predictability, continuity have many positive consequences.

I started to think about the issue of continuity and discontinuity in a different way, a way I hadn’t considered in the past. I connected this to my own childhood, in which I experienced some major discontinuities. Born in Nebraska, my family lived on a farm for three years. I attended a small rural school where there were four children in one classroom spanning kindergarten through second grade.

We moved from rural Nebraska to Beverly Hills California the summer before I entered third grade, facing considerable cultural, economic, and religious differences. After one year in Beverly Hills, we moved to suburban Pasadena, where the schools were predominantly white. Before I entered ninth grade, we moved again to downtown Pasadena, where I (a white girl) went to a school with a majority of students who were Black and Hispanic.

With each move, I experienced significant change, and each time, I welcomed it. I considered each move an adventure, and an opportunity to learn new things. I found the changes at each juncture provided opportunities to have different experiences, interact with different people, and grow. Discontinuity, disequilibrium, and encountering change is not always negative.

This caused me to think again about the role of disequilibrium in development, both cognitive and affective. What is our role in curating children's experiences in terms of continuity and discontinuity as we are doing when we build continuity of teachers in children's experiences?

Looking Again at Piaget's Theoretical Concept of Adaptation: Early Piaget

Thinking about these issues – what are we doing to support or stifle children's development – led me to reflect on some of my early studies of Piaget, whose work has meant a great deal to me throughout my career, focusing on the developmental significance and meaning of *adaptation*.

I was introduced to Piaget's theory in my master's program in developmental psychology in the early 1970s, while I was working with young children. Much of his theory resonated with me and seemed to reflect what I was seeing in young children and learning through my work – children's agency, theory-building, and the development of autonomy. But Piaget's *stage* theory was the predominant focus at the time.

Focus on Stages of Development

Adaptation, as a biological term, is defined as how living things change over time to fit into a particular environment. In Piaget's theory adaptation consists of two sub-processes, assimilation and accommodation. As children interact in the world they apply their schemas/theories to their experiences (assimilation) and change their schemas/theories in response to the experiences (accommodation).

In early studies of Piagetian theory, these processes of adaptation are described as underlying the movement towards equilibrium, the state of balance that was used to describe the stages of intellectual development that Piaget discusses – the sensorimotor stage (birth to age 2), the preoperational stage (2 to 7 years), the concrete operational stage (7 to 11 years), and the formal operational stage (11 years and up).

For many years, these processes – adaptation, assimilation and accommodation – and the stages of development posited by Piaget were the primary focus of study. While this did help us understand the broad qualitative differences across the stages in how children think and learn, there were many limitations to stage theory. Critiques of Piagetian theory were often grounded on these limitations.

Concerns About This View of Adaptation

I found the study of developmental stages helpful only in a very general way. It did not reflect the incredible changes and variability within each stage in young children's thinking and actions. Nor did it help me to understand the processes of learning as children were constructing their understanding. It also did not help me to understand how to support children's theory-building during their exploration and play through teacher's actions, including planning the social and physical environment.

Study in Geneva, and Piaget's Changing Views of Adaptation

During my doctoral program in early childhood education I realized my insufficient understanding of Piaget's theory, and in 1975 took a leave to study at the University of Geneva, where I was able to sit in on Piaget's weekly meetings of the International Center of Genetic Epistemology and take coursework without having to take examinations.

It was an extraordinary intellectual experience, and it included a study group of graduate students reading, page by page and in French, Piaget's newly published book *The Development of Thought: Equilibration of Cognitive Structures*. This experience deepened and transformed my view of Piaget's theory as he shifted his views of adaptation:

- From seeing equilibrium as a stage (static) to equilibration as a process (dynamic)
- From ontogenesis (development throughout childhood) to microgenesis (moment-by-moment change during a short time)
- From stages of development to children's theory-building in the classroom

Let me illustrate this with an example of a child "building down" with giant Legos. The context is the Early Childhood Center at the University of Oregon, a lab school I started and directed where we were exploring constructivist practices with 3-5 year old children. The event described was videotaped in 1983. I will be focusing on Mark, who was 5 years old at the time.

The children have been playing with Giant Legos, building towers up and building them across the floor. One of the practices we have been exploring is introducing children to something that challenges the theories they have been constructing. Towards that end, on the day of this example, the teacher tells the children that the blocks are suspended from the ceiling, without any further introduction.

Mark approaches the suspended block and begins by attaching one block at a time as he builds down. With the third block, they fall. He then repeats his action, with the same outcome. He puts the three blocks together and tries to attach them. They fall. He tries again, with the same outcome.

One possibility (my hypothesis based on his actions) is that Mark is engaged in the process of theory-building. From his earlier experiences with the blocks he has constructed an understanding of how to build with them – he could put one block at a time to build a vertical structure from the bottom up, or he could put several blocks together and then place them on the base. As Piaget's theory suggests, children apply their existing theories to the problem presented to them. But with the blocks suspended, Mark's existing theories don't work. Issues of gravity and weight come into play in building down that are not relevant when building up. So Mark is confronted with contradiction, his previous strategies challenged, putting his theoretical understanding into disequilibrium. (We'll return to this example later.)

Looking Again: A Changing View of Adaptation from Equilibrium to Equilibration, and a Focus on “*Equilibration Majorante*” or “Increasing/Improving/Optimizing Equilibration”

In the preface of Piaget’s book on equilibration described earlier, he speaks of “equilibration as a process – and not only of equilibriums – and above all of ‘**increasing equilibrations**’ as the manner of correcting and completing the preceding forms of equilibriums” (p. v). The term “increasing equilibrations” is significant; the original French is “*equilibration majorante*” which has also been translated as “optimizing equilibration.”

Constance Kamii, in her review of Piaget’s book (1986), discusses the importance of this change.

“...Equilibration does not mean a return to a previous state of equilibrium. Instead, it means a process that involves the creation, or construction, of new forms that lead to better, improved equilibria.”

Fosnot and Perry (2005, p. 17) describe how in new situations “this process results in a ‘reach beyond the grasp’ as one evolves, searches for new knowledge, and encounters ‘new territory.’” They go on to say that these experiences sometimes “foster contradictions to our present understandings, making them insufficient, thus perturbing and disequilibrating the structure...”.

Back to Mark, he continues his efforts to build down...

Mark’s attempts to attach single, then multiple blocks from the suspended block have not succeeded. He then begins to construct a length of blocks flat on the floor, five to six of them in a row. Once completed, he puts the five-block segment upright, and stations it underneath the suspended block. He encounters two problems – the structure isn’t tall enough to reach the suspended block, and the “teeth” of the suspended block point down, while the teeth of the block on the floor point up. He stands for a minute looking at this.

The two problems stem from the differences between building up and building down, and he is relying on his experiences of building up. Mark is experiencing conflict.

The Importance of Conflict

This conflict is important. Eleanor Duckworth, discussing her research on learning, says that it demonstrates the importance of children’s experience of conflict and contradiction in moving toward understanding. She says “At certain levels, the children do not even see the conflicts in their own thinking. Conflicting notions are simply compartmentalized, and no need is felt to reconcile them. Only if children recognized and were bothered by a conflict did they sometimes manage to construct a more adequate notion to coordinate the two conflicting ones.”

Piaget, in his introduction to Duckworth's work on learning (cited by Duckworth, 1979, p. 304), comments that what is significant about this research on learning is that "in every case where acceleration takes place, it results from a conflict arising in the child's own mind. It is the child's own effort to resolve a conflict that takes him or her on to another level."

Mark's experience of theory-building, although occurring in the context of a supportive constructivist classroom, is an illustration of a child theory-building without direct social interaction as he confronts the discrepancies in his own theories and constructs a new understanding. This cognitive conflict, as described by Damon (1984, p. 332) is "a perceived sense of contradiction between what the child believes and what the world is telling the child. If the child becomes aware of such a contradiction, the experience has a disequilibrating (or perturbing effect) on the child, instigating the child to question his or her beliefs and try out new ones. Cognitive conflict, therefore, is a catalyst for change." In addition to children theory-building in their own solo play, like Mark is, theory-building also occurs in the social context, where "...the equal relationship among peers leaves children open to considering, rather than merely accepting a differing view. This consideration and coordination of viewpoints can lead to cognitive conflict or disequilibrium..." (Britain, 1992, p. 16). Britain documents how children provoke each other's thinking by providing "conflicting notions," fueling each other's disequilibrium as they are building theories together.

Mark persists with his task of trying to build from the suspended block to the floor...

Mark puts the block segment back on the floor, then picks it up with the teeth pointing down so that it will align with the suspended block. But it is still too short. He takes another block and places it on top of the segment but does so with the teeth pointing up instead of down. He notices this right away, and turns it over, attaching it to the segment. The alignment with the suspended block isn't perfect, but he raises the suspended block so that the segment fits and locks it into place.

He steps back, waves his hands up and down the completed block structure, and says "I did it!" to himself, smiling.

Mark posed a clear task to himself, not one articulated by the teacher, and not the same as what other children around him were doing. His sense of accomplishing his task is evident by his declaration of "I did it!"

Equilibration and the Role of Affectivity

This final declaration – "I did it!" – raises another element of equilibration, the element and role of affect and emotion. What are the affective components of disequilibrium, conflict, and contradiction? What is the motivation to move forward in the face of challenge? Piaget's work on affectivity and affective development, overlooked by many, is helpful here. In his major work on the subject, Piaget (1981, a translation based on lectures presented at the Sorbonne 1953-54) argues that while affective and cognitive

factors are indissociable in concrete behavior they are different in nature and function. Faced with something new that challenges our understanding, we act only if we are disequilibrated, which is motivated by a need, and this results in a feeling of satisfaction upon moving toward equilibrium. Hence, Mark's declaration, "I DID IT!!!" Piaget describes affectivity as playing the role of a necessary energy source on which "the functioning but not the structures of intelligence would depend. It would be like gasoline, which activates the motor of an automobile but does not modify its structure" (Piaget, 1981, p. 5).

"Increasing Equilibration": Why is This Important?

Mark was engaged in theory-building, which is an important way to consider the process of adaptation, and particularly of "increasing equilibration." Theory building consists of applying your theory to the learning encounter, seeing what happens, sometimes trying it again, and then changing your strategy based on what you observe. But it is more than that, as it leads to a "better" equilibration. Some think of theory-building as "trial and error" but that implies it is simply a correction, arriving at a solution to a problem. Instead, it is a building upon, a venture into something new and different, a "better and improved equilibrium" as Kamii states above. This is a significant difference with implications for the goals of education, which are, as Piaget (1976, p. 20) says,

"To understand is to discover, or reconstruct by discovery, and such conditions must be complied with if in the future individuals are to be formed who are capable of production and creativity and not simply repetition."

There is quite a profound difference between seeing adaptation as becoming "fitted to one's environment" by returning to a state of equilibrium or regaining balance. Instead, children's development is biologically a system in which the movement has the propensity to get better through experiences, but only if children are given the support, space, and time in which to theory-build, in a social constructivist context.

Looking Again at the Practice of Looping

The impetus for this look at adaptation stemmed from my own positive experiences of discontinuity, of experiencing significant changes throughout my childhood. Why this was a positive experience for me, and not for one of my siblings, does not have a simple answer. How individual children respond to conflict, contradiction, and disequilibrium is a complex mix of affective and cognitive dispositions, as well as environmental supports. Nonetheless, it is important to acknowledge that it is precisely this disequilibrium that moves our development forward, which is something not always acknowledged. We do not necessarily want to minimize opportunities for disequilibrium.

Zooming out on the nature of adaptation and the value of disequilibrium has provoked a surprising personal response – a reaffirmation of my belief in children's capabilities and our capacity as adults to support their development, to provide the environments and experiences in which children like Mark can explore the unknown,

encounter dissonance, move not just forward but upward in their development, surpassing what went before. As Piaget says,

The principal goal of education is to create people who are capable of doing new things, not simply of repeating what other generations have done – people who are creative, inventive, and discoverers.

Adaptation to the Abnormal: How Re-thinking Adaptation has Inspired Me and Given Me Hope

We are in tumultuous times of change and disequilibrium. Many of us have been experiencing the prospect of facing a dark and uncertain future. I find myself defiantly fighting adaptation to the unsettling experiences we are faced with, unwilling to accommodate my world view to accept what is happening as inevitable, unwilling and/or unable to adapt to the unexpected challenges that confront us. In revisiting the idea of *equilibration majorante* I have found a framework for thinking about adaptation, one that is both comforting and inspiring. It is reminiscent of the experiences I had when the work of Reggio Emilia was first on our radar in the late 1970s, and the inspiration it evoked in my students and myself gave me hope that things could be better for young children. Referring to the work in Reggio Emilia as providing a “vision of utopia,” Peter Moss’s (2014, p. 2) book discusses “new stories” about early childhood education:

“...Though the times are dark and uncertain, and the new stories need be under no illusions, neither need they be stories of unmitigated doom and gloom. They can offer hope that another world is possible, a world that is more equal, democratic and sustainable, a world where surprise and wonder, diversity and complexity find their rightful place in early childhood education, indeed all education. They can offer faith in people, of all ages, and their potentialities. They can offer us cause to believe in the world again.”

Final Thoughts

As Sergio Spaggiari said:

As educators, we firmly believe in optimism and in hope. We have faith. We, as educators, don't want to stop; we want to carry on, walking forward.

Loris Malaguzzi says, forcefully, “...education must stand on the side of optimism or else it will melt like ice cream in the sun.”

And there IS hope – hope in the work we do that enables children to go beyond what is.

In a beautiful publication from Reggio Children (2001) on children’s research about the future, Mariam, one of the children involved says:

*The future is tomorrow
and I can only imagine it
I think it's...
a lovely day.*

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The State of Projects in the Elementary School Classroom: A Constructivist Perspective

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Abstract

Constructivist frameworks support meaningful, dynamic projects in the elementary classroom. When undertaking authentic project approaches, students choose to engage with topics of interest, construct understandings through research and inquiry-based explorations, and they creatively showcase their understandings through highly divergent products. Projects are ubiquitous in elementary classrooms. However, the pedagogical approaches, student outcomes, and assessments involved with projects vary widely. A substantial range of philosophical and theoretical supports undergird project strategies from highly teacher-directed/curriculum-centered to entirely student-owned/child-centered. Furthermore, project opportunities for students range from cut-and-paste projects to highly creative endeavors with real-world applications. Various terms such as Project-Based-Learning, Problem-Based-Learning, Project Approach, Inquiry-Based Learning, Phenomenon-Based Learning and High-Quality-Project-Based-Learning saturate the literature and the parlance of teachers. Even generic terms such as experiential learning, hands-on, or active learning are used to describe generic projects in the classroom. Since projects have become so wide ranging in definition and practice, and the implementation has become diluted to the point of being unrecognizable in certain contexts, the authors of this report seek to lend clarity to the current state of projects in elementary school settings, especially from a constructivist perspective.

The use of projects in elementary school settings has long been the practice of teachers. Over several decades, projects have morphed into a hodgepodge of disjointed approaches rooted in various theories of learning. Despite the ubiquity of “projects” in elementary settings, the variability in definitions, strategies/approaches, assessments, and implementation is wide ranging and often contradictory. Projects have undergone a protracted speciation with different branches and lineages (of approaches) evolving and dominating pockets of education in both time and space. The increasing variability of projects has led to a significant conceptual dilution of both the term and its implementation in schools. In addition, “projects” can be used as a reward or a closure to a unit where rubrics and specified criteria are provided by the teacher. Essentially, the word “project” can be used to describe literally almost any classroom practice with few or perhaps no common threads of conceptualization or practical realization.

From a constructivist lens, projects become much clearer in definition and purpose. Constructivist theory suggests that learning is an embedded, contextually dependent building of knowledge through meaningful and relevant personal experiences and social interactions (Ültanir, 2012). Furthermore, constructivism holds that the unique cognitive, social, cultural, and physical activities of the learner within contextual domains is paramount to the personal interpretations, perceptions, and construction of knowledge (Bada & Olusegun, 2015; Noddings, 1973). Therefore, the constructivist epistemology centers on the active rather than the passive experiences of the individual. Choice, autonomy, and interest are key components of a constructivist approach in that the individual constructions of knowledge are more likely to occur through the intrinsically motivated activity of the child within real-world contexts and social situations. Constructivist projects, or Dynamic Projects, as the authors suggest, are highly divergent, based in interest and curiosity, entirely child-led (i.e., self-chosen, self-directed), are process and product-oriented, and they are creative endeavors that showcase what matters to children and how they approach the exploration of a topic, either independently, or with a group of students. In order to build a framework for Dynamic Projects, it is necessary to explore the history, theoretical foundations, and manifestations of projects in schools.

A Brief History of Projects and Their Underlying Philosophy

From antiquity through the 20th century, an accretion of a certain branch of epistemology was built by the intellectual heavyweights of their respective times. These layers of philosophy culminated in a broad theoretical paradigm that is known today as constructivism. Projects would become a key component of constructivist practice in the 20th and 21st centuries. However, the underlying principles of a constructivist, project-based approach in schools can be traced back for millennia.

One of the main components of projects (learning by doing) can be discovered as far back as Confucius (551-479 BC), who believed that the internalization and application of knowledge through self-cultivation and social interaction was key to building knowledge for oneself. (LiFT, 2021). Early Greek philosophers like Socrates

(470-399 BC) and Aristotle (384-322 BC) produced a line of thinking that supported a practical education, which uniquely belonged to the individual. Socrates believed in learning through questioning and through critical thinking with a relentless pursuit of awakening the truth (Mares, 2018). Aristotle believed in the importance of practical experience for developing moral and intellectual virtues, and he was concerned with the welfare of the individual and of society (Mares, 2018). These three ancient philosophers built an existential foundation for some of the practices that would come to be known as child-centered and constructivist, and they would underpin the later pedagogical approaches that support project-based learning (i.e., self-directed learning, social interaction and collaboration, inquiry, critical thinking, and practical/hands-on experiences).

Much later, John Comenius (a 17th century Czech educational reformer and religious leader) promoted the idea that the learning process should be centered on the individual learner and not the teacher (LiFT Learning, 2021). Furthermore, he believed that learning should be tied directly to real-world experiences. Johann Pestalozzi (1746-1827) and Friedrich Fröbel (1782-1852) advocated for active participation through student choice and that students should express themselves through play, respectively. These three, European, 17th and 18th century pedagogues advocated for an approach to education that belonged to the child, and that learning should be based in interest and enacted through the powerful engine of curiosity. Playful, choice-driven activity, especially when situated within real-world contexts, was not only a potent learning approach, but necessary for individual ownership and engagement.

John Dewey (1859-1952) was a founding father of progressive education and an early proponent of project-based schooling (i.e., learning by doing), which was echoed by his contemporary, Maria Montessori (1870-1952). These two educational theorists were instrumental in setting the foundation for modern, constructivist, project-based teaching and learning in schools. Their emphases on student self-direction, practical and experiential learning, and real-world connections were critical to the significantly increased implementation of child-centered practices as they emerged from centuries of theory and came to a head in the early 20th century.

The “Project Method” was developed by John Dewey’s student, William Heard Kilpatrick (1871-1965) in 1918, and it emphasized student learning through meaningful activities that were student-driven, exploratory, and purposeful (i.e., had real-world implications and mattered to the student). His method represented a significant contrast to traditional methods that emphasized sterile, isolated learning environments and techniques that fostered the memorization and regurgitation of facts. Kilpatrick (1918) believed that each child’s unique interests, attitudes, and capacities were the keys to building meaningful projects that suited the individual and aided in the learning of relevant, practical knowledge. Furthermore, projects were the “wholehearted” exploration of a topic in a social environment in which “constructive activities” occurred in “natural conditions” (IIMTT, 2023, .0:25). Kilpatrick devised four project types including: Constructive Projects (resulting in a physical product like a letter or model),

Aesthetic Projects (artistic purpose like music, art, or poetry), Problematic Projects (intellectual endeavors that seek to answer questions), and Drill Projects (increases capacity of students' practical skills like drawing a map) (IIMTT, 2023; Kilpatrick, 1918).

In 1969, McMaster University's medical school pioneered Problem-Based Learning (PBL), which was a special type of project-based learning where students could learn content through interacting and trying to solve real-world problems. Their early PBL approach was "fluid and variable," involved small group learning, and it was realistic and/or involved real-world problems (Servant-Miklos, 2019, p. 3). Furthermore, there was little or no lecture, nor were there any other top-down modes of instruction (i.e., Direct Instruction/Explicit Instruction), and summative forms of assessment were non-existent in their program (Servant-Miklos, 2019). Their PBL program was found to enhance student motivation, improve knowledge retention, help students develop critical skills, and aid in the development of a life-long love of learning (Lee & Kwan, 1997; McMaster University, 2025). McMaster's innovative program coincided with a rapid rise in Project-Based Learning across schools in the United States in the 1960s and 1970s.

In 1992, Lilian Katz and Sylvia Chard published "The Project Approach," which furthered the work of earlier theorists and practitioners. They defined projects as an "extended study of a topic usually undertaken by a group of children, sometimes by a whole class, and occasionally by an individual child. The study is an investigation into various aspects of a topic that is of interest to the participating children and judged worthy of attention by their teachers" (Katz & Chard, 1992, p. 3). Furthermore, they believed that projects were developmental in nature and involved students in the "applications of a variety of intellectual, academic, and social skills and competencies" (Katz & Chard, 1992, p. 3). Katz and Chard (1992) decided to use the term, "project approach," rather than "method" or "model" because they believed that it was only one important aspect of an early childhood curriculum and that it should not represent a "total teaching method or model" (p. 2). The Project Approach and its current manifestations will be described in more detail in the following sections as well.

In the late 1990s, Jo Boaler, a professor at Stanford University, found that students in project-based schools performed significantly better in school than students in traditional schools, "both on math problems requiring analytical or conceptual thought and on those considered rote, that is, those requiring memory of a rule or formula" (Edutopia, 2001, para. 3). In fact, Boaler (1997) found that three times as many students at project-based schools received the top grades on the national math test when compared to traditional students who received Direct Instruction.

One year later, a group of researchers from Stanford and Vanderbilt University studied Problem- and Project-Based Learning. They identified four design principles including the following: "defining learning appropriate goals that lead to deep understanding, providing scaffolds...and beginning with problem-based learning

activities before initiating projects, ensuring multiple opportunities for formative self-assessment and revision, and developing social structures that promote participation and a sense of agency” (Barron et al., 1998, p. 271). This study provided significant evidence of the numerous benefits of PBL including gains in the students’ abilities and understandings, a boost in student achievement, and students’ high level of interest and energy for projects.

It is important to note that these two studies emerged at a time when the United States was gearing up for No Child Left Behind, which would require standards and high-stakes accountability measures in all 50 states. Despite these being some of the first empirical studies that noted the substantial benefits of project-based learning, there was a clear influence from the political and educational landscape of the time. Projects, as defined and operationalized in schools, would become increasingly teacher-directed and curriculum-centered over the next two decades. Baron et al. (1998) left a prescient warning: “As a nation, we are in danger of once again failing to realize the educational potential of these reemerging approaches [Project-Based Learning]. If curriculum changes are not made carefully with adequate planning and support, we risk a political backlash that favors back-to-basics and rote learning over authentic inquiry” (p. 272). The warning represented a legitimate fear, and one that was realized in the coming decades. As the United States, and indeed much of the world became obsessed with data, test scores, standards, high-stakes accountability, and rigorously paced curricula, any potential for projects to shine as a beacon of constructivist theory and practice were snuffed out. Under No Child Left Behind, projects became a puppet strategy of traditional, behavioristic, curriculum-centered ideology, and they conformed to the expectations of a system that demanded uniformity and data-driven practice.

Link Between Projects and Constructivism

Projects are ubiquitous, but as was just mentioned, they are more often informed by the educational philosophy of behaviorism rather than constructivism. The alignment with educational objectives that serves standards-based curriculum and instruction dictates a significantly narrowed approach to projects that contradicts the philosophical and theoretical foundations that should undergird authentic practice. Teachers provide examples from previous years, emphasize a rigid adherence to the predetermined rubric, push hard deadlines, and offer little to no student voice and choice. This is why projects look significantly watered down in the educational landscape. Educators are trying too hard to make them something that they are not and to make them achieve goals they were never meant to achieve, at least uniformly. Therefore, it is necessary to explore the connections between constructivist philosophy and projects to separate and support the approaches that more closely align with the historical and theoretical underpinnings.

In addition to the brief history previously described, there are a few more names to discuss when examining the constructivist connections to projects. In the 18th century, Jean-Jacques Rousseau (1712-1778) advocated for “children to explore and

learn naturally” through “direct interaction with a natural environment that optimizes their curiosity and exploration” (Seyfer, 2025, para. 4). Rousseau’s *Emile* (1762) is a lasting testament to children’s individual freedom, self-reliance, and the corrupting influence of society that today could be taken as the shackling influence of top-down control structures in schools. His work contributed to the foundation of constructivist thought in that children learn naturally through their experiences and learn to be self-directed. These ideas fit within a constructivist project approach in that children are free to explore their own topics of interest as they perceive and interact with the world around them. Projects should be interest-led, curiosity-driven, and self-directed with any goals set by the child or group of children rather than well-meaning adults with a scripted curriculum in hand. Students should guide their own learning with the encouragement and support of a teacher. However, current manifestations of PBL have been watered down by teachers who are only interested in designing specific outcomes from the start.

Later in the 20th century, Jean Piaget (1896-1980), who pioneered modern constructivist theory, contributed the idea that learning is an individual and active construction in the mind of a child through their relevant experiences and social interactions (Piaget, 1964). His theory of cognitive development supported a project approach in that children could actively build their knowledge through their experiences and explorations, which is perfectly suited to the student-led, choice-driven activities within an intrinsically motivated project endeavor. Lev Vygotsky (1896-1934), who was an earlier contemporary of Piaget, influenced project theory in that his Zone of Proximal Development allowed for students to grow in their knowledge when they work collaboratively with a more knowledgeable peer or teacher, thus supporting teachers as facilitators and guides of learning rather than being the sole providers of knowledge (Vygotsky, 1978). His work also emphasized the importance of social interaction in the learning process. Projects should see the individual child or children as the main stakeholders, with educators serving only as facilitators to scaffold for children when necessary. Projects should also allow for natural opportunities for socialization, collaboration, and mutual inquiries of interest. Teachers should not force social collaborations (i.e., assigning students to work in groups or partners with specific goals in mind), but rather provide the conditions where collaboration is organic, choice-driven, and led by mutual interest.

Other relevant connections to constructivism and projects include inquiry-based learning. Inquiry is an approach that fosters student questioning and encourages students to conduct their own investigations and explorations of content through the natural engine of their curiosity (Fan & Ye, 2022). Inquiry-based learning is rooted in constructivist theory in that children build their own knowledge through personal experiences, but part of that process of knowledge-building is questioning and exploring (Gholam, 2019). One organizational structure that formally involves inquiry in projects is The Project-Based Inquiry Global (NC State University, 2025) framework, which involves the following elements: “Students ask compelling questions, gather and analyze

sources, creatively synthesize claims and evidences, critically evaluate and revise, and share, publish and act” (para. 1). Though this framework tends to be more teacher-directed, it represents the important role of inquiry in the project process. A closely related idea is that of Phenomenon-Based Learning, which is a holistic, interdisciplinary approach to learning as children interact with and explore phenomena in the world. It is built on constructivism and the concepts of problem-based learning and inquiry-based learning (Schaffar & Wolff, 2024). The individual child or self-chosen group of children explore different ideas based on their own interests by asking questions and seeking to solve real-world problems or understand real-world contexts. Projects naturally fit within a Phenomenon-Based or Inquiry-Based approach.

Brooks and Brooks (1999) suggest that the nature of schools is counter to the very definitions of constructivism. In support of authentic theory and practice, they mention that “Educators must invite students to experience the world’s richness, empower them to ask their own questions and seek their own answers, and challenge them to understand the world’s complexities” as they construct understandings and search for tools to aid them along the way (p. 5). However, schools, according to Brooks and Brooks (1999), only demand superficial memorizations of pre-packaged content, and they reduce the interconnectedness and complexities of the world into discrete, isolated chunks of information that are easily delivered and passively consumed by students who are deprived of the opportunities to think for themselves.

The Manifestations and Contexts of Projects

Brooks and Brooks (1999) description of the traditional nature of schools is often how projects manifest. According to Edutopia (2007), Project-Based Learning should start with an essential question (determined and posed by the teacher), involve a plan (connected to and derived from content standards), create a schedule (paced and part of the scope and sequence of the curriculum with benchmarks and deadlines), monitor students’ progress (to maintain control and compliance), and assess the outcome (to ensure alignment with standards and relay data to school administrators). In the Edutopia description, it mentions that the teacher should have content standards in mind, but that students should “feel” like they have ownership. This is what Alfie Kohn (1993) describes as a “pseudochoice,” in which students appear to have a consequential decision-making capacity, but really there is only one acceptable choice predetermined by the teacher. Nel Noddings (1992) once said, “We cannot enter into dialogue with children when we know that our decision is already made” (p. 23). Often, the idea of a project in schools is presented like a Trojan Horse. On the outside, the project appears to involve meaningful choices and the freedom to explore. However, the delivery is hiding ulterior motives; students are expected to convey certain content, learn certain standards, and comply with teacher directives. Students often feel compelled to participate in “projects” because there’s a grade associated with the “project,” and “projects” can be openly compared to those of their classmates and connected to state standards.

The Buck Institute for Education's PBLWorks (2025), describes two different types of projects including "dessert projects" and "main course projects." The dessert project is an "intellectually-light" project undertaken by the student once the standardized learning has already been achieved (i.e., at the end of a traditional unit). The "Gold Standard" or "Main Course" project is one that is rigorous and is the main vehicle for teaching the "important knowledge and skills students need to learn" (para. 5). The Main Course project is one that encompasses the entire unit including the "frames for curriculum and instruction" (para. 5). PBLWorks defines the parameters for the Main Course project as follows:

- Instruction is integrated into project
- The project is driven by student inquiry
- The focus is both the product and process
- The project is aligned with academic standards and success skills
- The project involves collaboration with students and guidance from the teacher
- The project has real-world context and applications
- The results are shared with a public audience

(PBLWorks, 2025)

Within the framework, there are authentic components that would fit within the constructivist paradigm. For example, student-directed inquiry, social collaboration, teacher as facilitator, and real-world contexts and applications certainly could reflect purist ideology in constructivism. However, there are also teacher-directed elements that could represent a significant misalignment with constructivist theory. Projects are often planned using a backward design approach to ensure all students meet the intended learning goals, guided by a clear and consistent rubric. The inclusion of standards-based instruction and the teaching of "rigorous academic content" through the project suggests that this approach could artificially be dragging students into a realm of curriculum-centeredness, where the expectations of the project are that students meet pre-determined goals and standards. Despite the fact that PBLWorks (2025) uses terms like "authentic" or "student voice and choice," the process could be contaminated with the overarching idea that students need to acquire specific grade-level content knowledge and skills. Often, the "voice and choice" is how the project is presented (i.e., students are told they will have meaningful choices within the "project") or students "choose" from a limited list of project ideas. However, this limits the freedom, creativity, and range that projects could involve if they were truly student-led.

The authenticity of these types of projects in terms of fidelity to constructivist practices and theory really depends on the implementation and how teachers interpret the framework. If teachers allow for substantial freedom and student ownership within the process and come alongside students to facilitate their interests more than the content standards, then these projects could be highly constructivist in nature. However, if teachers are limiting what and how students study with specific content

standards, pacing, and benchmarking in mind, then the projects have missed the mark entirely.

In 2018, High Quality Project Based Learning was established to standardize the definition and approach of PBL to include a framework that can be used to judge if a project is high quality. This work was funded by the Project Management Institute Educational Foundation and the Flora Hewlett Foundation, while being facilitated by the Buck Institute for Education (HQPBL, 2018). The HQPBL framework represents six criteria that teachers can use to judge project quality including the following:

- Intellectual Challenge and Accomplishment: “Students learn deeply, think critically, and strive for excellence.”
- Authenticity: “Students work on projects that are meaningful and relevant to their culture, their lives, and their future.”
- Public Product: “Students’ work is publicly displayed, discussed, and critiqued.”
- Collaboration: “Students collaborate with other students in person or online and/or receive guidance from adult mentors and experts.”
- Project Management: “Students use a project management process that enables them to proceed effectively from project initiation to completion.”
- Reflection: “Students reflect on their work and their learning throughout the project.”

(HQPBL, 2018)

Again, the implementation of HQPBL depends on the amount of freedom and personal motivation that students have within the project space. HQPBL (2018) suggests that “Students need to learn important academic content, concepts, and skills” within the project space, but they also mention that “students’ voices should be heard in a project, and they should be able to make choices about their work” (p. 3). These concepts are not necessarily mutually exclusive, nor are they necessarily in conflict, but they do represent a potentially problematic alignment issue. What is the goal? Who owns the process and product(s)? There is an inherent struggle in the idea that students should be able to explore their interests in a way that makes sense to them while the teachers are trying to accomplish the goals of the standards and curriculum programs that dominate schools. It is possible that both could occur simultaneously, but only if the individual student’s project topic fits neatly within a standards-based area. More often than not, the educator is forced to choose one of these pathways, and because of the demands of the system, they choose the needs of the curriculum over the needs/interests of the student.

As briefly mentioned earlier, the Project Approach is still in use in schools across the world, and it is currently managed by the Educators Institute at Duke University. In fact, the Project Approach Teacher Education Network (PATEN) is “a group of educators committed to and experienced in implementing the Project Approach with learners of all ages in a variety of settings” all over the world (ProjectApproach.Org, n.d.). Currently, the Project Approach centers on “Authentic Discovery, Problem-

Solving, and Natural Curiosity” with a focus on “teaching strategies that enable teachers to guide students through in-depth studies of real-world topics” (The Project Approach, n.d., para. 2). These ideas certainly fit within a constructivist paradigm. However, the Project Approach also expects children to produce high-quality work (as judged by adults), and as Katz and Chard originally intended, projects should not represent the whole education but should be used alongside explicit instruction to achieve the goals of the standards and curriculum. This could indicate a lack of trust and value in the project process; projects should have an axiological importance to the child, which is invaluable to the construction of knowledge and personal interpretations of the world. However, the Project Approach, like other frameworks, shifts the axiological emphasis into the realm of the teacher. Furthermore, the Project Approach, in implementation, often follows similar pathways as the Gold Standard or HQPBL frameworks. It starts with an essential question, has required components, tends to be convergent in terms of process (not necessarily product), and it can be more teacher-directed. One of the key differences between the Project Approach and the Gold Standard is that for the Project Approach, instruction takes place separately from the project, but in the Gold Standard, the project is all-encompassing (including the curriculum and instruction).

It is important to note that the authors are not making statements regarding the efficacy or value of the Gold Standard, HQPBL, or Project Approach strategies. These all seem to have value and have been evidenced to be effective in the classroom. The authors are examining the alignment of these strategies with purist constructivist theory and practices in mind. Though they share elements of constructivism, they do not wholly align, which suggests a need for a modified approach to projects that fits squarely within the constructivist paradigm.

Other types of projects including the aforementioned Problem-Based Learning have the potential for some alignment with constructivist ideology as well. Problem-Based Learning has undergone its own changes over time including varying definitions and approaches. However, it is still used (though not as widely as the more mainstream Project-Based Learning) and is evidenced to be widely effective. Yew and Goh (2016) suggest that Problem-Based Learning, which consists of “educational contexts [that] promote critical thinking and problem-solving in authentic learning situations” is superior in terms of its efficacy for long-term retention and the application of knowledge (p. 75). This particular branch of Project-Based Learning (which shares an acronym – PBL) is worthy of its own deep dive and connections to constructivist theory, but elements of Problem-Based Learning are recommended as a part of Dynamic Projects.

Other project strategies exist in schools including Genius Hour, a concept originating with Google and the idea that employees should spend 20% of their time on interest-based projects. Davis (2022) mentions that “students are searching for meaning, and genius projects are the perfect vehicle to show them how much they matter” (para. 1). The concept involves passion projects where students own the questions, processes, and outcomes of a project entirely. Students engaged in these types of projects see better mental health, and greater learning as they are better engaged in the classroom through

their own unique interests and ways of exploring content that matters to them (Davis, 2022). In terms of alignment with Constructivist theory, this type of project is the closest fit and represents an exceptional pathway for children to engage, investigate, and explore without the constraints of a curriculum narrowing their field of view.

Many other project types still exist in the school system as well. In fact, many teachers have their own brand or method, individualized and implemented in their classrooms. If teachers are asked about projects, many different definitions and approaches will be explained. Some projects manifest as “cut and paste” tasks, where students literally find information online or in books and fit that information into predesigned templates. They copy the information from one page to another (with or without paraphrasing). Other projects are centered in the teacher-directed realm where the teacher owns the initial question or content, determines the standardized process to be undertaken, and owns the convergent outcomes, which are aligned with standards and/or the curriculum. Yet others are situated in the child-centered realm, where individual children own the questions or content, determine their own procedures, and there are many divergent outcomes. Along the project spectrum, from the extremes just described, there are many in-between versions. Educators could benefit from a clearer picture of projects and how they align with constructivist theory.

Bringing Clarity to Projects as Constructivist Practice (Dynamic Projects)

From the ancient theoretical foundations to the modern pedagogical approaches, projects have become widely used and just as widely interpreted. In order to provide clarity for constructivist teachers, it is necessary to provide a modified framework for projects that aligns with theory and supports students’ construction of knowledge in real-world, relevant, and meaningful contexts.

Based on the preceding information, the first concern in creating constructivist, dynamic projects is that of value. Educators need to understand that knowledge is uniquely created in the mind of an individual child as they interact with their world and engage with concepts that are of interest. Through meaningful, relevant, personally interesting activity (i.e., we learn by doing), children can construct understandings, either new, or in addition to previously built knowledge, and develop a lasting retention and ability to apply that knowledge in various contexts. Therefore, teachers need to understand the value of situating the project in the realm of the child’s mind (their interests, passions, abilities, development, culture, background, and perceptions of the world). Because of this ontological nature of children, projects need to be open-ended. No standards or curriculum should be the guiding force that shapes the initial questions, interests, or explorations of the child. The value or “quality” is in the cognitive and social process that is undertaken by the child engaged in a Dynamic Project. It is not in how closely the child can align with teachers’ preconceived notions of excellence or standards-based instruction.

Likewise, projects should be highly creative and divergent. Due to the diversity of human intelligence and capacities, the manifestation of children’s projects should be

wide-ranging and non-conforming. There should not be any standardized process, product, or outcomes that narrow the child's capacity for creativity, critical thinking, and/or problem-solving. Projects should involve an understanding of child development and the fact that not all children can do the same thing at the same time or think the same way as their peers. Given the diversity of children in the classroom, projects should represent a wide range of expression and experience, allowing children to showcase a broad range of ideas, formats, and methods, unrestricted by expectations of conformity or imposed standards. A benchmarked, paced, standards-based curriculum has no business dictating the project process because projects should allow for a range of human abilities and understandings. Therefore, educators cannot take a seemingly sophisticated, advanced project from one child and compare that with the rather basic project from another child. Comparisons and standardized grading have no place in Dynamic Projects.

Dynamic Projects can be individual or social/collaborative in nature, but the choice to engage with peers needs to be a decision made by the children, and it should be an organic process that occurs because of mutual interest rather than a teacher-made decision with some goal in mind. Like play, projects should be self-chosen and self-directed by the children. Autonomy and choice are highly valuable and fit squarely within a constructivist paradigm. Interest and curiosity are the guiding principles and represent the key mode for why and how children make decisions. In other words, they are intrinsically motivated explorations that matter to the child and bring enjoyment and fulfillment to the child's wonder. Choices have to be meaningful and consequential, meaning that there is weight behind the child's decisions to study a topic, determine a path for investigation, and produce a product in a way that fits the child's understandings.

Projects should be inquiry and/or phenomena-based explorations that satisfy the child's curiosities. Through the process, children learn what questions to ask, how to explore those questions, and can reflect on how to improve their inquiries in the future, providing them actual ownership over their knowledge building. The role of the teacher is purely as a co-explorer, facilitator, and guide who can provide scaffolding for the child to reach the next level of understanding if the child needs or so desires. The teacher is not the curriculum master who shapes the process to align with the content that should be taught, but the teacher can assess how the child is using skills or engaging with content within their own interest-based explorations. Dynamic Projects involve an ungrading approach, with no scores or grades, but purely a narrative, descriptive feedback that allows for growth in the process over time. Through the constructivist approach, learning for the students becomes a collaborative, evolving process grounded in relevance and real-world applications.

Conclusion

In conclusion, projects need a theoretical reorientation, and constructivism provides a potent framework for developing dynamic projects that serve the interests and needs of the child rather than the needs of a dominating curriculum. Despite decades of top-down behaviorist influences in schools, an opportunity now exists to shape the practices of the future for the better.

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Making as Learning

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The students in my PreK (ages 4 and 5) class love to make. Anything. They will take bits and bobs stored in our collage bear, add paper and tape, and voila, have a creation of which they are very proud. Sometimes, these creations are a frozen moment of time for a newly-created mechanical device, others are the start of sequence. Some of the creations are rather prosaic to my eyes, all have incredible stories that go with them.

But what is the significance of the making? Why are they encouraged to make so much? Part of that comes from our class setup. One of my favorite quotes comes from Giambattista Vico and it is “We only know what we create.” Our classroom has the largest maker space we can create, filled with all manners of paper, ribbons, wood bits, and random recycled plastic objects. We have a variety of tools; including the standard scissors and hole punches as well as more specialized cardboard tools, sewing tools, and some metalworking tools. Each child is taught how to properly use the material and provided safety gear. The trust given to each child is using these tools adds confidence and agency in their work.

Another aspect is their growing skills, especially their fine motor skills. As the children grow in their abilities to use scissors and other tools they want to use these skills. We see this in gross motor skills – as young walkers learn to walk up the stairs, all they want to do is walk up and down stairs. It is no different with fine motor skills. They want to use them and seek out opportunities to use their developing skills.

As the students make things, they learn to ask questions, and refine those questions. They begin to learn where and how they can find answers to their questions. They learn vocabulary and prosody as they begin to explain their ideas and what compromises they had to make with their ideas due to the materials. When my students create things with their hands, they learn the properties of materials. They begin to dream and turn those dreams into reality.

While this may sound hyperbolic, I have seen this repeated year after year, in various school settings across the country. Several recent examples. During a flower exploration, one student began making a water lily. This led quite naturally to learning about the structure of the water lily and solving challenges for creating one out of paper (see photo 1). This also led the child to begin thinking about the structure of other plants and sharing this information with classmates on the playground as she explored our cottonwood and peach trees, as well as the herbs in one of our garden beds. She and her classmates took this further by asking if other living things had the same kind of structures. Last week, while playing the “goes together” word game during a wait time, another student who had become involved in this used the words “tree” and “human”;

she explained that the relationship she was thinking of was that both are living creatures with tubes that move fluid through them.

Making leads to extending ideas and developing new knowledge as well. One student started building a house out of cardboard. This led to another house, and yet another. Before long, we had a cluster of houses in the class. How would they be arranged? This led to a discussion about land use and property sizes. The houses had garages, which meant we needed roads for the cars and some kind of fueling (the class was split between gas power and battery powered cars). That led to questions about infrastructure of getting gasoline to the stations and the power to the houses (see photos 2 and 3)

A third example while exploring our future careers. To support these dreams, we did many traditional classroom activities such as reading books, having special guests, and watched videos on the topic. The students could also make. One of my students wants to be a combination clothing designer, cheerleader, and astronaut later in life. This student made prototypes of clothing using paper, which led to a discussion of what should be the requirements of clothing to be an astronaut and why paper wasn't the ideal material for many reasons. (see photo 4)

In each of these examples, one can easily see how the children constructed different knowledges: physical as they explore the properties of the materials and the tools; logico-mathematical as they developed the relationships between different materials, tools, and their ideas, and language as they developed the vocabulary to express their ideas as well as respond to questions about their ideas which encourages additional refinement.

When they develop these knowledges, they make sense of their world and begin to ask additional questions. They know they are powerful questioners and learners.

I assess how each child has constructed knowledge through using examples of their actions, words, and artifacts. I can also see how making in the classroom adapts easily to and stretches each student. Such differentiation also includes equity as the student is following his / her interests. The teacher can create scaffolds specifically designed for that student, be it language, experiences, or other challenges. Additionally, when children collaborate and construct that language knowledge in context, it helps everyone, including many Multi-Lingual Learner (MLL) students as well as many non-verbal, or other students with limited language skills

Additionally, such customization supports family relationships as the family knows the teacher is focusing on each individual student. That also paves the way for bringing in more of each child's funds of knowledge and often increases the community connections.

My experiences with the students making in the classroom has led to an ever-upwards cycle of both student and teacher learning as they ask questions, construct

meaning, apply this information into new situations, and ask new questions. Try making in your classroom and be amazed by your students.

Photo 1:

A child's paper water lily, made while exploring flower structure



Photo 3:

Roads and fueling stations added to the neighborhood, raising infrastructure questions



Photo 2: Cardboard houses arranged as a neighborhood, prompting questions about land use



Photo 4: Paper clothing prototypes for astronauts



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A Coat of Many Colors: The Construction of Clothing in a Multi-age Preschool Classroom

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Abstract

This research project examines the integration of project-based learning in a multi-age preschool classroom, focusing on the construction of clothing. Key questions explored include: How can a project on clothing construction support development across various domains and content areas? How can it be used to teach empathy by exploring the stories and experiences of those who made or wore the clothing? Following the three phases of the Project Approach (Helm, Katz, & Wilson 2023), children engaged in hands-on activities such as designing and constructing clothing, which facilitated their exploration of cultural diversity, textiles, and the emotional connections tied to garments. The findings revealed that the project not only engaged children in meaningful, hands-on learning, but also fostered empathy and kindness. Through this process, children learned to appreciate the stories behind the clothing, deepening their understanding of others' experiences. The study highlights the potential of project-based learning as a powerful approach in early childhood education, enabling educators to create relevant, child-centered learning experiences that promote holistic development. It also underscores the importance of nurturing children's natural curiosities and interests as pathways to deeper engagement and understanding in their learning processes.

Introduction to the Project

A project is an in-depth exploration of a topic that sparks curiosity, where a small group, the whole class, or an individual child engages in focused research to answer questions about the topic, posed by the children, the teacher, or together collaboratively (Katz 1994). This is an account of how project work was integrated into a preschool classroom, demonstrating the implementation of the three phases from Lilian Katz's Project Approach (Helm, Katz, & Wilson 2023) in a purposeful, child-centered way to promote meaningful learning. In this project, the topic of clothing was explored in a multi-age preschool class, with children ranging from two to four years old. Ideas for the project emerged from observations of the children during center time, where many showed interest in the dress-up clothing in the dramatic play area. This became the inspiration for exploring the possibility of introducing clothing as a potential project.

Children's interest was further piqued after introducing them to the book *Coat of Many Colors* (Parton 1996), which is based on the lyrics written by songwriter Dolly Parton (Parton, 1971). The story, rich with emotion and personal history, depicts how young Dolly's mother crafted a special coat from scraps of fabric—rags—sewn together with love and care. In Dolly's words, “*I recall a box of rags that someone gave us, and how my mamma put those rags to use*” (Parton, 1971). This narrative seemed to captivate the children and marked the beginning of the *Construction of Clothing Project*. Inspired by the story, the children and classroom teacher—all considered in this context as *investigators* and *co-learners*—embarked on an in-depth exploration of the clothing-making process, from selecting and repurposing materials to understanding the emotional connections woven into each creation.

Teacher Research Questions

As a new teacher excited to explore project-based learning with preschoolers, I was filled with questions. Which aspects of clothing would captivate the children most? How could a project on clothing construction support development and learning across domains and content areas such as mathematics, literacy, science, and art? Additionally, how could clothing construction be used to teach empathy by exploring the stories and experiences of those who made or wore the clothing? As I engaged in the project alongside the children, I began to answer these questions and uncover many more, while also supporting the children in developing their own research questions and wonderings. I will share the evolution of this three-phase project by providing an overview of each phase based on the work of Helm, Katz, and Wilson (2023), a description of activities and learning experiences, and reflections on both my learning and the children's.

Phase I: Getting Started

Phase one of the Project Approach, as outlined by Helm, Katz, and Wilson (2023), establishes the foundation for the inquiry. In this phase, teachers and children collaboratively explore topics, posing questions and sharing ideas. Teachers also complete anticipatory webs to identify potential lines of inquiry and plan focusing activities that provide common experiences for children. These experiences help engage children and guide their thinking, allowing the teacher to assess the level of interest and engagement. The teacher decides whether to proceed with the project based on the children's responses and emerging interests. This phase sets the stage for deeper exploration, ensuring the project is relevant and meaningful to the children's curiosity and developmental goals.

Anticipatory webbing and connecting to standards. Phase one began when I noticed the children's interest in clothing and recognized it as the foundation for a potential project. To explore various directions the project could take, I created an anticipatory web. Based on my initial observations, I thought the children would be most interested in learning about different types of clothing and how to create outfits. I also anticipated they might be curious about cultural diversity through clothing, comparing fabrics and textures, the work of seamstresses and fashion designers, and making their own clothes.

I considered how early learning standards across various domains and content areas could be integrated into these potential lines of inquiry. For example, learning to make clothing offers opportunities to incorporate mathematics through precise measurement and cutting, allowing children to practice concepts like fractions, geometry, and spatial reasoning while supporting fine motor skills and hand-eye coordination. Cutting fabric also introduces physical and chemical changes, as its appearance may change, but its composition remains the same. Additionally, sketching designs encourages creativity and exploration of design, color theory, and composition. By blending math, science, art, and other content areas, the project would foster practical skills, development across domains, and imaginative expression, making learning both engaging and meaningful. Unsure which direction the project would take and what learning opportunities might be involved, I decided to provide some common initial experiences to engage the children and guide my observations.

Providing a common experience. To focus the group, I read the book *Coat of Many Colors* as a shared experience. This reading provided a common foundation and resonated with the children, who were deeply rooted in Appalachian culture. Many of them recognized Dolly Parton and made connections to Dollywood and the Imagination Library, a program designed to provide developmentally appropriate books to young children from birth through age five, and they were curious about her life as a little girl.

After the story, we discussed the children's ideas and questions, and two key points became clear. First, a small group of girls showed strong interest in clothing construction, leading the inquiry with questions like, "Can we learn to sew? Can we make something? How are clothes made from scratch? Can we make a dress?" Second, the children firmly rejected the idea of bullying or teasing others for their clothing or differences. In *Coat of Many Colors*, Dolly's classmates laugh at her homemade coat, sparking a deep conversation. The children strongly asserted that it's never acceptable to tease someone because of what they wear. We discussed how it's okay to look different, just as Dolly proudly wore her coat of many colors. This story not only promoted an appreciation for unique clothing but also allowed us to explore important social-emotional themes and consider how to weave moral and social justice issues into our exploration of clothing construction.

Offering new experiences. To stimulate further thinking and open-ended exploration, I brought various fabric materials into the classroom—different colors, textures, and types, such as silk, cotton, polyester, velour, and satin. I invited the small group of girls who had shown the most interest in making clothing to explore the fabrics first. Very quickly, they decided that they should make something with the fabric, just like Dolly's mother had made her a coat.

Caroline was instantly interested in a piece of blue, "sparkly" velour material. She picked it up to explore the texture and movement of the fabric. She stated, "Let's cut it. It's so sparkly, and I want my dress to be sparkly." Yasmin and Delaney also explored different fabric pieces, imagining the possibilities. "I need to do a mermaid costume. I need to make a dress. I need to make a Barbie costume," Yasmin said. Like fashion designers, I asked the children to consider sketching their clothing designs. The small group of girls took this task seriously, imagining what they could create. Since the project took place during the fall, they began associating their designs with potential Halloween costumes.

The children's enthusiasm, particularly from the small group of girls, was a driving force in shaping the project's direction. Their curiosity and excitement about how clothing is made led us to dive deeper into the topic. Motivated by their questions and ideas, we decided to explore the process of clothing construction in more detail, which set the stage for Phase II of the project.

Phase II: Developing the Project and Investigation

Phase II of the Project Approach (Helm, Katz, & Wilson 2023) centers on investigation and inquiry, allowing children to explore a topic in depth through hands-on activities, research, and experimentation. During this phase, teachers support exploration by providing resources, asking guiding questions, and fostering critical thinking. Ongoing documentation of learning is essential, enabling both teachers and children to reflect on

and refine the focus based on emerging interests. The aim is for children to construct knowledge through their experiences, with teachers scaffolding their discoveries.

As we moved into the project's next phase, I wondered whether other children would be as engaged in constructing clothing as the initial group of girls. It's common for a core group to drive the project, with other children joining intermittently (Broderick & Hong 2011). I expected this dynamic, but as Helm, Katz, and Wilson (2023) suggest, teachers should aim to involve more children as the project progresses.

To do this, I repeated the learning experience—exploring materials and sketching designs—with some of the younger children in the classroom. The children were excited to explore the materials, which included children's books featuring different types of clothing and fabrics with various textures. We discussed sketching their ideas, and, like their older classmates, the children began making connections between fabric and Halloween costumes as the holiday approached. As more children began to engage in the project, the core group of girls remained welcoming, with the original three girls helping younger children by demonstrating how to use materials like scissors.

Another aspect of Phase II is sharing artifacts as inspirational and tangible materials to explore. On Halloween, I decided to wear my poodle skirt that my grandmother, mother, and I had all created together. Just as Dolly's mother constructed her coat, my mother and grandmother made my poodle skirt from scratch, "sewing every stitch with love" (Parton 1971). I used this opportunity to discuss constructing a piece of clothing with the children. Sharing artifacts like my poodle skirt enables the teacher to facilitate discussions, drawing the children back to relate to the original topic through these concrete materials that represent the ideas we have been exploring (DeVries et al. 2002; Morrow 2011).

Scaffolding through sewing simulation. Despite my limited sewing skills, I was determined to support the children throughout the project. As a researcher and fellow learner, I recognized the value of scaffolding our journey together. Just as I needed one more learning step before we started sewing dresses, I knew they would, too. One morning, inspiration struck: we could create paper purses as a way to simulate the sewing process before tackling real clothing pieces.

In our purse-making adventure, the children paired two pieces of construction paper, punched holes along three edges, and then "stitched" them together using vibrant yarn or ribbon. They carefully selected their materials, pouring their focus and creativity into the task. This activity allowed them to learn to use a hole punch, developing fine motor skills as they worked independently after my guidance. Using yarn or ribbon was a perfect fit; it was much easier to thread through the punched holes than the tiny thread and bobbin of traditional sewing. As I watched the original three girls from our

group, I was amazed by the detail and creativity they infused into their purses. It was a joyful moment, beautifully demonstrating their growth and enthusiasm for learning.

Using new knowledge and skills to construct clothing. With newfound skills from the purse-making activity, the core group of girls were ready to take the next step and begin cutting fabric and “stitching” real clothing. This progression felt natural; the experience the children gained through making the purses prepared them for this new challenge. I believed the girls were ready to move forward, and it was exciting to think that we were about to create a wearable garment.

The night before, I had prepared an example piece, a simple poncho-style garment that involved cutting out a hole for the head and stitching up the two sides for the arms. This design encompassed all the essential components of sewing: measuring fabric, cutting, and stitching, while being developmentally appropriate for beginners.

The next day, the young fashion designers eagerly selected materials for their dresses. The teacher demonstrated how to cut fabric, encouraging them as they practiced. The girls took turns role-playing; each child became a “model” while the others served as “designers” or “seamstresses.” They measured the material, draped it on one of the girls who took the role of being a model, and worked together to lace up or “stitch” the sides of the dresses. Their collaboration was seamless, and each girl created a special piece. While these were not elaborate dresses made with a sewing machine—after all, we hand-stitched the sides—the garments held deep meaning, reflecting the thought and effort invested over time. I was impressed by the math, literacy, fine motor, and social skills they developed throughout each step. This journey was as much about personal growth and community building as it was about creating garments.

Once the girls from the core group finished their pieces, their pride in their hard work was palpable. Inspired by their accomplishments, we decided to hold a fashion show where they could model their creations for the rest of the class. As they took to the “runway,” the other children erupted with excitement, clamoring, “I want to make a dress, Teacher!” and “I want a costume!” Some even exclaimed, “I want an ‘Elsa’ dress!” or “I want a ‘Batman’ cape!” For the next week or two, we dove into a flurry of activity, cutting fabric and crafting capes and dresses. It was a wonderful opportunity to invite all children into this creative process.

Phase III: Reflections and Conclusions

In Phase III of the project, as described by Helm, Katz, and Wilson (2023), children summarize what they have learned throughout their exploration and engage in a culminating activity or event. This phase allows them to elaborate on their understanding, deepening and personalizing their knowledge (Katz & Chard 2000). As they reflect on their experiences, they consolidate and integrate information from various activities and discussions within the project. The culminating activity allows

them to demonstrate their learning meaningfully, helping to make connections between different aspects of the project and solidifying their understanding. This final phase makes their learning more personal and relevant while offering a sense of accomplishment and closure.

Phase III of our project was dedicated to reflecting on what we had learned and taking time to look back on our journey. Over the course of two months, we had explored many facets of clothing construction—everything from sketching initial designs to creating our own garments. This final phase allowed us to revisit the entire process, taking stock of the skills and knowledge we had gained along the way. Phase III was not only about bringing the project to a close but also about celebrating the journey, recognizing the progress made, and reflecting on how far we had come together as a community of learners.

The children decided to do a fashion show as one culminating activity. As each child presented their creation, a sense of pride and accomplishment permeated the room. The event was more than just a display of finished projects; it celebrated hard work, growth, and collaboration. It marked a moment when the children could reflect on their learning, share their experiences with peers, and see how their collective efforts had come together to create something meaningful. This culminating event brought the project full circle, highlighting community and shared achievement. After our fashion show was over, we discussed what we should do with our finished pieces. In the spirit of giving and community, the children decided to donate their garments to our classroom's dress-up center, allowing them to continue exploring and engaging with the clothing they had created.

Reflecting as a community. As our sewing project came to a meaningful conclusion, we gathered for a re-reading of *Coat of Many Colors* by Dolly Parton. This time, the children brought a newfound depth to their understanding of the story, reflected in their conversations about the importance of kindness and acceptance. They discussed how we should never pick on others based on their clothing and shared insights about their own special articles of clothing. Their ability to express such profound moral lessons at such a young age—three and four years old—was heartwarming and gratifying as an educator.

In considering how to wrap up our journey, I recalled Helm and Katz's (2016) suggestion of finding a way to celebrate and bring closure to long-term projects. I decided that playing Dolly Parton's original song, "Coat of Many Colors," would be a fitting tribute to our work. As we listened together, the children connected the music to the story we had first read months before; this final experience served as an opportunity to better integrate [reinforcing] the themes we had explored throughout our project. This served as a meaningful and intentional way to celebrate our investment in the project while infusing elements of our Appalachian culture.

Conclusion

In conclusion, this project provided a transformative experience for children, intertwining creativity with practical skills through clothing construction. Over two months, children designed and sewed their own garments, which not only fostered critical thinking and problem-solving but also nurtured collaboration and a sense of community. The culmination of their efforts in a fashion show and the meaningful decision to donate their creations highlighted their pride in their work. Reflection played a crucial role in consolidating their learning, as discussions around "Coat of Many Colors" deepened their understanding of kindness and self-expression, enhanced further by the moral message of Dolly Parton's story and song. Ultimately, this project exemplified the significance of project-based learning, showing how it can engage children in meaningful experiences that connect with their values and lives while promoting learning and creativity.

Implications for Educators

The Project Approach is an incredibly effective method for fostering deep, meaningful learning by tapping into children's natural curiosities and interests. To begin, it's essential to observe the children closely and identify what sparks their fascination. The power of project-based learning lies in its ability to build directly from these interests, making learning feel highly relevant and engaging for each child. This approach allows for flexible, child-centered exploration that is both stimulating and impactful. Through my own experience, I learned that it's okay for a small core group of children to take the lead and drive the direction of the project. Other children may join the project at different stages, depending on their interests and developmental readiness. This fluidity is part of the beauty of the Project Approach—it accommodates children's varying levels of engagement and allows them to enter and exit the learning process in ways that are comfortable and natural. Some may be deeply involved from the start, while others may enter later and still contribute meaningfully.

Documentation is essential in project-based learning, allowing teachers to capture children's thinking, creativity, and problem-solving in real time. It provides insights into how children engage with the project, helps assess the success of activities, and informs decisions about next steps. In this project, documentation was particularly valuable. By taking photos and noting children's comments and questions, I was able to track their progress and understand how they connected their work with learning across domains and content areas. This reflection helped me adjust the project to better meet their interests and needs, ensuring an engaging and responsive curriculum.

Finally, incorporating literature and music with cultural relevance to the children's community is a valuable way to support their emotional engagement in learning. By thoughtfully selecting books that connect to the children's lives and

experiences, teachers can foster deeper emotional connections to the content and encourage reflection on their own identities and values. Purposeful provocations, such as these, help create meaningful, child-centered learning experiences. In this project, the book *Coat of Many Colors* by Dolly Parton served as a powerful provocation, connecting the children to themes of empathy, self-expression, and cultural identity through the story of Dolly's homemade coat. This story and song not only sparked conversations about the significance of clothing but also helped children relate to the emotions and experiences behind the garments they were creating. By integrating such culturally relevant narratives, the project became more meaningful, supporting both the children's emotional development and their connection to the learning process.

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Letter from the Authors

The project work presented in this piece is especially relevant to Appalachian culture, as it originally stemmed from using the children's book *Coat of Many Colors* (Parton, 1994) with a multi-age preschool classroom at an East Tennessee university lab school. When this book was presented to the children as a whole group read aloud experience, there was already a major connection to prior knowledge and experience, as everyone immediately knew and recognized *Dolly Parton*.

With Parton's recent passing earlier this year, the editors felt it was important to acknowledge the undeniable impact that she has had not just on the state of Tennessee, but on a global level. Aside from children of all ages connecting to her through music, storytelling, and nostalgic trips to Dollywood, she was a major source of philanthropic efforts to support young children. Perhaps most notably, she started [Dolly Parton's Imagination Library](#), which provides children birth to five with free, appropriate, high-quality books. This began as an endeavor to ensure children (not just in Tennessee or in the United States, but on an international level) had access to literacy materials. Considering the context on a personal level, her own father never had the opportunity to learn how to read; thus, literacy (along with imagination) was something she deeply valued and supported.

At one point in time, this work was shared with David Dotson, the CEO of the Dollywood Foundation, and his response to this project was as follows:

"Thank you so much for your creative and impactful work. For many years, we have received wonderful letters from teachers who, on their own, created a Coat curriculum for their children. Your project is much more intensive but all of the ideas taken together are a powerful testimony to the impact of the story. A few years ago, I began to research possible options to sell a Coat curriculum to schools. The song is in two music education curriculums but like you, I believe we have a great opportunity to do something special."

With that being said, we would like to dedicate this article to learners of all ages who *will always love Dolly*.

Dr. Randa Dunlap & Dr. Teressa Sumrall

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SUBMISSION OF ARTICLES

Both full-length articles and brief reports will be considered for publication.

Articles that will best fit the journal are neither formal research reports nor detailed curriculum and lesson plans. There are numerous academic journals and practitioner journals that are better homes for those articles. The journal will also discourage overt promotion of a particular educational site (school, museum, or other organizations) or professional development programs.

Foci for articles that are especially welcome include: ideas about how students learn, differences between adult (including teachers, curriculum) and child understandings, and how educational values and approaches are brought to life in classroom practice. This is not an inclusive list; you are encouraged to communicate with the editors to suggest other ideas but realize that execution of what you propose is what will be reviewed to determine publication.

“Brief reports” can include a wide range of insights that you think are important enough to share but do not expect to make the focus of a complete paper. Try to discuss concepts in a way that will be of interest to a range of readers (i.e., not just researchers in a narrow field, not just sharing lessons with other teachers). Length can range between approximately 1 and 8 pages, including minimal citations to acknowledge sources of inspiration.

Submissions may be sent to: James Foss fossj@umn.edu

Reviewing will be selective. Submissions will be blind reviewed.