



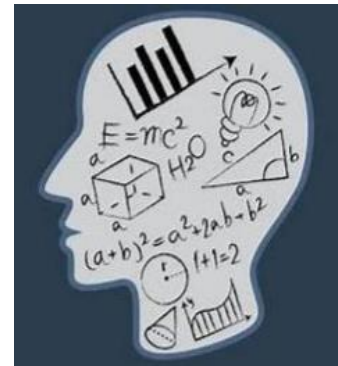
Ki jan yo gide elev yo nan yon konpreyansyon gwo twou san fon nan konsepsyon matematik

How to Guide Students to a Deep Understanding of Math Concepts

By Nell McAnelly

Sevi ak meye blok yo konstriksyon nan komansman aprantisaj matematik elev yo ka sipote yon lavi nanpanse abstrè.

Using the right building blocks at the start of students' mathematical learning can support a lifetime of abstract thinking.



Le nou pasyone sou yon sijè, oswa menm yon pastan, nou gen tandans eksplòre li nan anpil fason ki posib.

Nou ta ka li liv oswa blogs yo aprann reyalyte, lide tes émergentes sou papye, epi kenbe not oswa lide nan tet nou jiskaske nou ka pale sou sijè a kom ekspe.

When we are passionate about a topic, or even a hobby, we tend to explore it in as many ways as possible. We might read books or blogs to learn facts, test emerging ideas on paper, and keep notes or ideas in our head until we can talk about the subject as experts.

Timoun yo aprann tre efikasan le li sevi avek menm pwosesis sa a. Pwofesè yo kapitalize sou sa nan klas la, oswa petet jou sa yo sou Zoom, le li sevi avek yon estrateji etap-pa-etap yo rele KPA (Konkre, Pictorial, Abstrè) pou ke elev yo ka deplase soti nan fe (konkre) yo we (pictorial) nan senbolik (abstrè). Twa blok bilding sa yo patikilyeman enpotan nan enstriksyon matematik.

Children learn very effectively using that same process. Teachers capitalize on this in the classroom, or perhaps these days over Zoom, by using a step-by-step strategy called CPA (Concrete, Pictorial, Abstract) so that students can move from doing (concrete) to seeing (pictorial) to symbolic (abstract). These three building blocks are particularly important in math instruction.

Le dirijan devlopman pwofesyonel pwofesyonel, mwen renmen konpare estrateji a ki ap deplase elev yo soti nan konkrè pictorial abstrè aprantisaj ki jan yo kondwi yon machin. Yon fwa ou ap aktyelman kondwi machin nan, ou ap deja nan faz abstrè a. Men, ki jan ou rive jwenn pwèn sa a?

When leading teacher professional development, I like to compare the strategy of moving students from concrete to pictorial to abstract to learning how to drive a car. Once you're actually driving the car, you're already in the abstract phase. But how do you reach that point?

Premyeman, ou dwe konnen fizikman ki sa ki yon machin e kisa li fe. Ou chita nan li epi aprann sou iyisyon an, wou a fwontye, ak lot pati kle, ak sa yo fe. Le sa a, ou antre nan faz la reprezantasyon, nan kote ou anvizaje etap sa yo bezwen yo kondwi. Petet ou gen yon pwogre nan je ou (piktorial) nan tout bagay ki bezwen fe: ajiste chez la ak miwa, pase senti, mete pye ou sou fren, chanjman nan kondwi, e plis. Finalman, apre yo fin fe pratik, ou rive nan sen nan kote kondwi vin telman otomatik (abstre) ke ou pa menm panse sou ak tout etap ki nan lis la.

First, you must know physically what a car is and what it does. You sit in it and learn about the ignition, the steering wheel, and other key parts, and what they do. Then, you enter the representational phase, in which you envision the steps needed to drive. Maybe you have a progression in your mind's eye (pictorial) of everything that needs to be done: adjust the seat and mirrors, put on your seat belt, put your foot on the brake, shift into drive, and so on. Finally, after practice, you arrive at the stage where driving becomes so automatic (abstract) that you don't even think about the checklist of steps.

Objektif la nan le li sevi avek blok yo bilding KPA se yo rive jwenn faz nan abstre ak yon konpreyansyon ki pemet fleksibilite ak konpetans pwoblem nan rezoud. Yon elev ta dwe finalman kapab travay nan abstre a, chwazi epi chwazi reyalite yo ak zouti ki nesese nan yon sitiyasyon patikilye. Mwen te jwenn sou ane yo ke estrateji sa a amelyore kapasite pwoblem jeneral-rezoud nan elev yo. Yo vin adepte nan transfere ladres yo te aprann ak aplike yo nan nouvo sitiyasyon.

The goal of using the CPA building blocks is to reach the abstract phase with an understanding that enables flexibility and proficiency in problem solving. A student should ultimately be able to work in the abstract, picking and choosing the facts and tools needed in a particular situation. I've found over the years that this strategy improves overall problem-solving abilities in students. They become adept at transferring the skills learned and applying them to new situations.

Pwogresyon KPA nan aprantisaj bone

The CPA Progression in Early Learning

Pou timoun ki nan pre-K oswa kindegadenn, we aranjman diferan nan senk obje, tankou bouton oswa blok, epi konte yo pou fe senk (konkre a) ede prepare elev yo pou aprann reyalite matematik debaz yo. Yo eksplote relasyon, lide tes, epi fe koneksyon. Bati fondasyon sa yo nan konesans se kle yo vin pale nan odinasyon san yo pa toujou gen konte nan kalkilatis pita.

For children in pre-K or kindergarten, seeing different arrangements of five objects, like buttons or blocks, and counting them to make five (the concrete) helps prepare the students to learn basic math facts. They explore relationships, test ideas, and make connections. Building those foundations of knowledge is key to becoming fluent in computation without always having to rely on a calculator later.

Le ou kapab ilistre obje fizik yo nan yon trase oswa model ekri (lide yo pictorial) klarifye, elaji pespektiv, ak ouve pot nan diferan apwoch nan pwoblem pou rezoud. Timoun yo aprann tradui obje yo we epi yo ka touche nan yon foto le yo desen mak tal, pwèn, oswa yon diagram.

Being able to illustrate the physical objects in a drawn or written model (the pictorial) clarifies ideas, expands perspectives, and opens doors to different approaches to problem-solving. Children learn to translate the objects they can see and touch into a picture by drawing tally marks, dots, or a diagram.

Reprezantasyon an matematik ta ka prezante tou nan mo yo ede klarifye panse elev yo. Se konsa, yon elev ta ka ekri yon fraz, oswa pwofese a ta ka prezante elev la ak yon fraz rapid tankou: "Yon aranjman nan de pwèn ak twa pwèn se senk pwèn."

The mathematical representation might also be presented in words to help the student clarify thoughts. So, a student might write a sentence, or the teacher might present the student with a prompting sentence such as, "An arrangement of two dots and three dots is five dots."

Finalman, zòn ki pi difisil nan aprantisaj ap deplase nan faz la abstrè. Pou timoun tre jèn yo, sa ka rekonèt ke yon aranjman nan obje senk san yo pa gen konte moso yo.

Finally, the most challenging area of learning is moving to the abstract phase. For very young children, this might be recognizing that an arrangement of objects is five without having to count the pieces.

Pwogresyon KPA nan anwo elemante ak klas mwayen

The CPA Progression in Upper Elementary and Middle Grades

Pi gran elemante ak timoun klas mwayen yo benefisyè de pwosesis CPA a tou, menm jan yo kontinye absòbe abstrè a. Pa egzanp, lide a nan ajoute "tankou obje" ka sanble tre senp ak odinasyon antyènimewo, men yon konsepsyon solid nan konsepsyon la vin yon fondasyon kritik pou atake plis materyèl avanse nan klas anwo, ki gen ladan kalkil ak nimewo rasyonel (fraksyon) oswa enkonik (varyab).

Older elementary and middle grade children benefit from the CPA process as well, as they continue to absorb the abstract. For instance, the idea of adding "like objects" may seem very simple with whole number computation, but a solid grasp of the concept becomes a critical

framework for tackling more advanced material in upper grades, including calculations with rational numbers (fractions) or unknowns (variables).

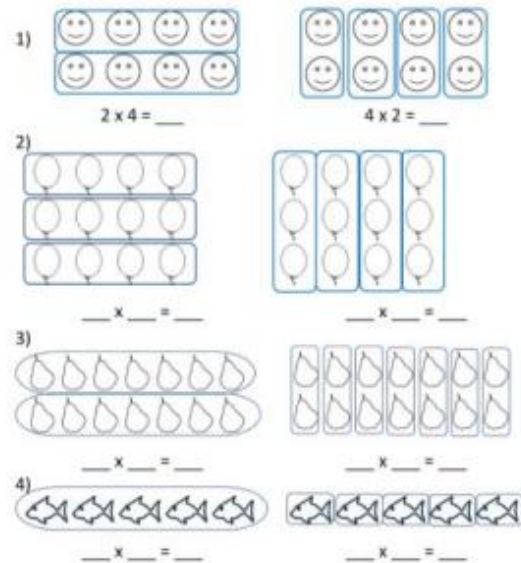
Pou egzanp, si elev yo gen yon konpreyansyon bon jan tankou kantite yo konbine, tankou nan " $2 + 3 = 5$," yo ka atake pwoblem konpleks de pli zan pli rasin nan lide sa yo ak pi plis fasil.

For example, if students have a thorough understanding of how like quantities are combined, such as in " $2 + 3 = 5$," they can tackle increasingly complex problems rooted in these ideas with much more ease.

Gen kek egzanp: • 2 pom + 3 pom ajoute jiska 5 pom. • 2 sizyem ak 3 sizyem egal 5 sizyem, oswa $2 / 6 + 3 / 6 = 5 / 6$. • 2

tankou enkonni ak 3 tankou unknowns se 5 tankou enkonni, oswa $2x + 3x = 5x$.

Here is an example: • 2 apples + 3 apples adds up to 5 apples. • 2 sixths and 3 sixths equals 5 sixths, or $2/6 + 3/6 = 5/6$. • 2 like unknowns and 3 like unknowns is 5 like unknowns, or $2x + 3x = 5x$.



Denye de egzanp sa yo paret nan rezime matematik ki soti nan elemante anwo nan aljeb epi yo komen bite-oswa bilding-blok pou elev yo. Le elev yo ap lite ak ki jan yo ajoute varyab nan aljeb, yo ka rate yon koneksyon ki nesese yo ale wout la tout antye de konkre abstre. Nan ka sa a, obje ki sanble yo ka konbine, pa gen pwoblem ki jan melanje obje yo yo. Menm jan pom ak pom yo sanble, x a ak x a yo sanble epi yo ka ajoute.

These last two examples appear in math curricula from upper elementary through algebra and are common stumbling—or building—blocks for students. When students struggle with how to add variables in algebra, they may have missed a connection necessary to go the entire way from concrete to abstract. In this case, objects that are alike may be combined, no matter how intangible the objects are. Just as apples and apples are alike, x 's and x 's are alike and may be added.

Prensip pou gide ou pandan ou ap itilize KPA blok bilding avek elev ou yo *Principles to Guide You as You Use CPA Building Blocks with Your Students*

Paran ki pa t aprann fason sa a ta ka mande: "Poukisa ale atrave tout pwoblem sa a? Li pran anpil tan, epi ou reyelman bezwen bouton oswa blok nan klas

matematik?" Ou ka eksplike CPA pou paran yo nan fason sa a: Se tankou gen wou fomasyon anvan ou aprann kijan pou monte yon wou regilye dewou. Li ede ou jwenn te komanse epi yo ka ekonomize tan pita pa ap grandi konpreyansyon kounye a. Avek matematik, ou ka kapab ale tou dwat nan abstrèpanse, men li la itil yo gen yon fallback yo rekonstwi pwosesis la nan ka ou bliye ekwasyon an oswa bezwen pou aplike pou lide a nan yon nouvo oswa plis pwoblèm kompleks.

Parents who didn't learn this way might ask, "Why go through all that trouble? It takes so much time, and do you really need buttons or blocks in math class?" You might explain CPA to parents this way: It's like having training wheels before learning how to ride a regular two-wheeler. It helps you get started and can save time later by growing understanding now. With math, you may be able to go straight to abstract thinking, but it's helpful to have a fallback to reconstruct the process in case you forget the equation or need to apply the idea to a new or more complex problem.

Epitou, aprantisaj se pa toujou lineye. Gen kek timoun ki gen dwa ale nan faz pictorial la byen vit oswa konprann yon konsepsyon nan yon fason abstrèpanse le yon sijè se premye prezante. Men, se pa pwenn antre pou pifwa timoun, epi si yo konfonn yon timoun pita, li ka nesese yo revize yon etap pi bonè.

Also, learning isn't always linear. Some young children may get to the pictorial phase quickly or understand a concept in an abstract way when a topic is first introduced. But that's not the point of entry for most children, and if a child is confused later, it may be necessary to revisit an earlier step.

Sonje byen ke senbol, ekwasyon, e menm tem matematik kapab yon mistè le elev yo premye rankontre yo, nan pwenn kote yo ka sanble yon lang etranje. Bilding soti nan konkrè nan piktorial abstrèpanse bay elev yo yon pwosesis nan krake kod la epi konprann "lang nan" yo itilize.

Remember as well that symbols, equations, and even mathematical terms can be a mystery when students first encounter them, to the point where they can look like a foreign language. Building from concrete to pictorial to abstract gives students a process to crack the code and understand the "language" used.

Finalman, KPA se echel natirel. Li enpotan ke elev yo konekte twa faz yo epi we yo kom lye, kom opoze fe yo konnen yo kom twa etap separe ak etap ki paret. Pwofese yo ka bay enspirasyon ak dirijan elev yo fe koneksyon si yo pa resevwa li sou pwop yo. Le yon elev ap lite avek yon konsepsyon nan pita klas, pwofese yo ka souvan trase ki twouve nan devlopman aprantisaj nan klas aprantisaj le zon konkrè oswa piktorial yo te sote oswa petet pa konekte. Pwofese yo ka pafwa adrese pwoblèm nan pa retounen nan yon nivo plis fondasyonel ak fe koneksyon entansyonel ant faz.

Finally, CPA is natural scaffolding. It's important that students connect the three phases and see them as linked, as opposed to perceiving them as three separate and unrelated steps. Teachers can give prompts and lead students to make connections if they are not getting it on their own. When a student struggles with a concept in later grades, teachers can frequently trace that gap to the learning development in earlier grades when the concrete or pictorial areas were skipped or perhaps not connected. Teachers can sometimes address the problem by returning to a more foundational level and making intentional connections between phases.

Si ou ap deplase pratik anseyman ou oswa ke yo te plis entansyonel sou yon estrateji ou deja itilize, leve blok yo CPA bilding kom yon apwoch enstriksyon debaz pral gen dirab benefis pou ou ak elev ou yo.

Whether you're shifting your teaching practice or being more intentional about a strategy you already use, leveraging the CPA building blocks as a core instructional approach will have lasting benefits for you and your students.



Misyon Nou

Kontinye Fè Gran Aktivite an Ayiti

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Sèvi ak HALO lè ou bezwen enprime pou a anplwaye ayisyen yo, mete lajan nan ekonomi lokal la, ankouraje alfabetizasyon an Ayiti epi edike anpil timoun.

Nou pibliye Super Teacher Worksheets gratis selman pou ede pwofese ayisyen yo amelyore enstriksyon nan klas yo. Epi nou pibliye anpil liv timoun pou achte. Yo genyen leson moral ak espirityèl ke profesè ak paran yo ka itilize pou bay sa jès, pasyans, jantiyès, jennozite, fidelite ak plis lot bagay anko pou nouvo jenerasyon Ayisyen an. Ou kapab wè li konplè sou sit entènèt nou an.

Our Mission

Continue the Great Commission in Haiti

About Us

Haitian Advanced Learning Opportunities is a 501(c)(3) nonprofit Christian ministry in Haiti. Our goal is to send as many young adults as we can to high school, trade school, and college. We fund the tuition costs through our publishing and printing business in Haiti.

Using HALO for your printing needs employs Haitians, puts money into the local economy, promotes literacy in Haiti and educates many.

We publish these free Super Teacher Worksheets solely to help Haitian teachers improve their instruction. We also publish children's books for purchase. They contain moral and spiritual lessons that teachers and parents can use to instill wisdom, patience, kindness, generosity, faithfulness and more into the future generation of Haiti. You can see the complete list at our website.

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