In College, But Not Always Earning College Credit

Evidence-Based Instructional Strategies for Success During—and Beyond—Developmental Courses

By Elizabeth L. Tighe, Meagan C. Arrastía-Chisholm, and Njeri M. Pringle

Academically underprepared postsecondary students make up a large proportion of college campuses. Recent estimates indicate that up to 70 percent of incoming students at two-year community colleges and up to 40 percent of incoming students at four-year colleges enroll in developmental courses.[1] These courses, sometimes also referred to as *remedial, basic skills, college preparatory*, or *pre-curriculum*, typically do not offer credit toward an associate or bachelor's degree. They largely enroll students who have completed high school (earning a traditional diploma or GED) and are offered across an array of subject areas (e.g., reading, writing, mathematics) to prepare students to progress to the demands of postsecondary coursework.

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There has been some criticism of the effectiveness of many of these developmental courses, as many students either do not complete them (most notably developmental mathematics) or do not progress to passing credit-bearing courses.[2] Fortunately, there are supportive, developmental instructional strategies that a substantial body of research demonstrates to be effective. In this article, we begin with suggestions for motivating students that apply across subject areas. Then, we provide more detailed descriptions of several evidence-based strategies that developmental instructors can use across reading, writing, and mathematics courses. We also offer some tips for teaching on virtual platforms. Although we describe these strategies individually, they are best used in concert through a mix of whole-group, small-group, and individualized instruction.

Motivating Adult Learners

Motivation encompasses many thoughts, feelings, and behaviors. Within the framework of self-regulated learning that is inherent to higher education,[3] motivation includes students' intrinsic interest, goal orientation, and self-efficacy. Each student enters the classroom with a unique motivational profile. By incorporating questions about motivation into relationship-building exercises at the beginning of a course, instructors can take this information into account and help promote higher self-efficacy. In turn, higher academic self-efficacy is associated with lifelong learning and the

enjoyment of learning. In essence, these positive motivational attributes are associated with good short-term learning outcomes, as well as achievement beyond formal education.[4]

Some research shows that instructors assume college students in developmental courses have low motivation, despite most students reporting high self-efficacy and a desire to learn.[5] Such assumptions could be problematic if they result in instructors making fewer inquiries into their students' needs. Imagine a young man who is routinely 10 minutes late to class. One might assume that he is not motivated, or one might inquire and discover that he works full time and his manager makes him do a few extra tasks each day as his shift ends—but he always rushes to class, skipping dinner, because he is highly motivated. This is a student who needs an accommodation—such as the instructor's class opener or warm-up exercise in an email earlier in the day. Common reactions, such as a warning or even an incentive to do better, are not likely to change his behavior, since the root cause is outside his control. Indeed, research shows that developmental students who enter the classroom motivated do not need extra incentives.[6]

Although motivation is often understood in the context of teaching K–12 students, there are some added considerations when teaching adult students in developmental courses, many of whom may be nontraditional students (e.g., adults with jobs and children). When teaching adults, it is especially important to acknowledge, honor, and incorporate their lived experiences in the classroom whenever possible.[7] Instructors should not only help their students find relevance in the material and utility in the skills being acquired but also actively elicit ways students can contribute to the lesson. In other words, students in developmental courses should be positioned as the experts whenever possible. On a contrasting note, developmental instructors need to be cautious when foundational skills are missing. Whereas in other classes an instructor might employ reciprocal teaching (making students dependent on each other), collaborative peer learning may not always work if students are lacking some skills required to teach fellow students. In these situations, consider creating opportunities for students to help inspire each other through exchanging life experiences.

Because of the independent nature of higher education, self-regulation (i.e., directing one's thoughts and behavior toward a task) should be modeled and explicitly taught.[8] For example, instructors should help students set goals, monitor their own progress, reflect on their learning, and seek help. Emphasizing learning goals over performance goals, in addition to making the connection between content and real life, can decrease anxiety and promote learning.[9] More research is needed on the motivation of developmental students, but teaching a growth mindset should be combined with academic intervention so that students both understand that they can improve and are given the knowledge and skills needed to improve.

Motivational components cannot stand in place of content instruction, but they can aid in cognitive changes that may help students persist.[10] Here are a few essential strategies:

- Communicate high expectations from the course outset. Make it clear that you expect that all of the students want to learn and that they will master the content. During the first class, provide learning objectives on the syllabus and orally communicate high expectations.[11]

- Allow students to be the experts when possible. Provide opportunities for students to share their knowledge and experiences (related to their professions, personal lives, and cultures) and acknowledge the skills they bring to the class.[12]

- Use incentives only if needed. Assume all students are motivated to learn, but increase motivational messaging and inquire about needs for those who lack or appear to lack motivation (e.g., through follow-up emails or texts if they are missing class). Build optional incentives into the course that will help students boost their performance, such as extra-credit assignments, multiple submissions (with feedback to scaffold learning), and/or dropping the lowest grade.[13]

When teaching adults, it is especially important to acknowledge, honor, and incorporate their lived experiences in the classroom.

- Be consistent with expectations and deadlines. Even with self-pacing, deadlines should be enforced with penalties for the sake of consistency. Grades in the course should come from performance-based assessments, not fluff grades (e.g., attendance, logging into the course, attitude).[14]

Higher-achieving developmental students may already know how to self-regulate their learning,[15] but lower-achieving students may not. In addition to the strategies above, instructors can weave lessons and tips for self-regulation into the instructional strategies for reading, writing, and mathematics described below.

Reading and Writing Instruction

Many developmental courses have recently shifted toward combining reading and writing instruction. These skills are essential not only for most of adult life but also for almost all subject areas—even within a developmental math course, for example, there are considerable reading and writing skills that students need in order to approach more complex word problems and to develop critical-thinking and mathematical reasoning skills.[16] A recent literature review provides an excellent overview of current, high-quality research on integrating reading and writing instruction (broadly termed *literacy*) for postsecondary students enrolled in developmental courses.[17] The review differentiates between bodies of literature that highlight different types of instructional approaches that can be common to reading and writing skills needed for struggling postsecondary students. We briefly outline each broad approach, as instructors may consider adopting aspects of different approaches to fit their unique classroom needs, and present some examples from research conducted within each approach. We also include specific strategies and skills within each approach for instructors to focus on in the classroom.

morphological problem solving, and thus help increase vocabulary and comprehension, focus the materials on using knowledge of base words, roots (i.e., etymology), and affixes to decompose complex, unknown words (e.g., with *multivariate*, a student can learn to relate it to *vary* and to known words with the same prefix like *multiplication* and *multivitamin*).[18] Also, instructors can work on building fluency by timing students as they practice reading increasingly complex connected text.

- For more advanced students (i.e., those who demonstrate strong foundational reading skills and at least a basic academic vocabulary), provide opportunities with many different types of texts to engage in monitoring comprehension (reflecting on and understanding what is read), paraphrasing (putting the text into their own words), identifying the main idea and summarizing text, forming bridging inferences across sentences within the text, elaborating (incorporating background knowledge to form inferences about the text), and predicting (inferring what might come next in the text).[19]

Strategy Instruction

This approach expands and deepens understanding of the skills from the discrete, decontextualized approach by allowing for instructor modeling and scaffolding using a step-by-step model (e.g., graphic organizers, mnemonic devices, think-alouds). It also builds off the concept of reciprocal teaching, in which after instructors provide modeling, students can teach-back material to the instructor and/or peers. Reciprocal teaching can foster deeper learning, critical thinking, comprehension monitoring, and idea development (especially for writing). The following are some evidence-based strategies that instructors can apply to reading and writing in developmental courses:

- Use pre-reading strategies (e.g., brainstorming, skimming) to help students comprehend complex text. For example, PILLAR—preview, identify, list, look online, attempt, read—is a pre-reading strategy to help students digest complex reading tasks in which they have limited background or content knowledge on the specific topic.[20] Of note, the "look online" step of PILLAR integrates the idea of using online resources to gain more information about new topics and take more self-initiative in the learning process.
- Integrate instructor modeling and scaffolding during writing instruction into the drafting and revision phases. In one example, students worked in small groups to discuss teacher expectations, and then the instructor modeled on a whiteboard the steps of revision. In addition, the instructor gave evaluative, individualized feedback on students' drafts.[21]
- Introduce a variety of metacognitive reading strategies and model them using multiple examples and think-alouds in class, then have students practice on texts and collaboratively with peers. For example, asking students to relate personal knowledge or experiences to the text, generate questions about the text, use annotations and notes to self during reading, and generate inferences were metacognitive strategies identified as useful in one developmental reading course.[22]
- Allow students to self-select reading comprehension strategies, which can facilitate greater autonomy and also enhance motivation and the desire to read and write more often.[23]

More research is needed on motivation, but teaching a growth mindset should be combined with academic intervention.

Discrete, Decontextualized Skills Approach

When assessments (including projects and other assignments developed by instructors) reveal specific skills and knowledge that individual students have not yet mastered, it is helpful for instructors to be efficient in addressing the particular weaknesses. For instance, in terms of reading instruction, this may include focusing on explicit instruction in basic phonological decoding, understanding vocabulary definitions and related synonyms and antonyms, and building metalinguistic awareness, such as unpacking the structure of complex words (e.g., peeling off prefixes and suffixes). In isolation, this type of approach often relies on repeated drilling of skills through worksheets or on practicing composing several essays. There is little focus on instructors modeling strategies (e.g., to approach reading passages or composing essays), on embedding digital materials, or on connecting work to current events and trends.

If assessments indicate a broad array of literacy needs and instructors are deciding where to begin parts of a discrete, decontextualized approach, developmental instructors may want to focus on the following skills:

- For lower-level students, address needs related to basic decoding, vocabulary knowledge, and background knowledge. For vocabulary, assign worksheets to extend familiar words (e.g., *vary*) to teach more complex morphologically and/or etymologically related words (e.g., *variable, variability, variety, variance, variants, variations, invariable, invariably*). To facilitate

New and Multiple Literacies

New and multiple literacies view reading and writing as broader social constructs; instructors are more interested in how students express themselves and communicate than in coaching students to demonstrate mastery of specific discrete skills.[24] Although we caution that all students need to master reading and writing skills in academic English—for everything from writing an accurate lab report in a chemistry class to drafting a concise proposal for a business class (not to mention accomplishing these things professionally)—there is value in cultivating individual expression and helping students find their voices. The following are some ideas for instructors who want to incorporate a broader concept of literacies:

- Use blogs and social media content that align with course curricula and goals to have students draft reflective essays.
- Integrate other modalities, such as podcasting and video-making, to allow students alternatives to communicate and convey ideas (while also refining writing skills as students draft and revise scripts or talking points).
- Focus on self-reflection during the writing process and allow students to examine their self-beliefs and identities related to writing.[25]

- Encourage students to share ideas about culture and cultural practices in discussions, readings, and writing activities.

Disciplinary and Contextualized Approaches

These approaches rely on bridging discrete reading, writing, and critical-thinking skills to other content areas (e.g., anthropology, geology). In particular, embedding vocabulary and morphological training on academic words and content-area passages related to US history and civics has been shown effective with students enrolled in English as a second language courses.[26] Similarly, there has been evidence of effectiveness of embedding reading strategy and self-explanation training into an introductory biology course with college students.[27] Specific to students in developmental courses, some work has shown effectiveness of integrating reading and writing strategies, such as building vocabulary and background knowledge, generating main ideas, identifying supportive details, summarizing, and thinking critically with historical texts[28] as well as with

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Adapting Instructional Strategies for Online Courses

With the increase in online learning opportunities and the need for remote instruction due to COVID-19, it's important to consider the challenges and features of online learning.[1] For instance, increasing motivation can be a tricky endeavor, especially if students do not have adequate technology and high-speed internet; and yet, technology enables greater personalization[2] and can even be adapted to appeal to students' emotions, which helps with motivation.[3]

Online learning also increases the accessibility of coursework in terms of both differentiating instruction and geographical location.[4] Although some online classes have regular meeting times when all students need to log in, others also increase accessibility by allowing students to access modules asynchronously. Students taking such classes can work at their own pace on coursework that is personalized to their skill level. Students can skip modules for content they have mastered and find additional exercises for skills they are still practicing. With online learning, students who live in rural or remote areas can access education without the financial burden of lengthy commutes or relocation. This also increases the

capacity of any institution of higher education to provide instruction for more students.

One downside of the physical distance between online students may be a decreased sense of presence and community. Even if students are working on personalized learning plans online, providing networking opportunities may help increase collaboration, inspiration, and support among students online. For example, the use of synchronized learning—for some, if not all, sessions—can provide opportunities to connect through videoconferencing.

The following are additional practical strategies for online or hybrid developmental courses (also see the "Digital Teaching Strategies" section on page 20):

- Survey students about their resources and needs for online learning. It is important to know what technology and type of internet connection is available to students if the institution is not providing the same resources for all students.[5]
- Personalize student content based on a diagnostic assessment. This will enable acceleration or remediation so that students can focus on the skills they need to master.[6]
- Provide motivational messages and personalized feedback online. Instructors with very large classes may consider using some automated feedback through scheduled

announcements or through the use of intelligent tutors.[7] Although more capable intelligent tutors are in development, most readily available learning management systems (e.g., Blackboard, D2L, iCollege) have some built-in intelligent tutoring capacities that save instructors time.

- Provide opportunities for students to connect and find commonalities. Use videoconferencing and messaging applications to connect with students and build a learning community so that students may get to know each other despite physical distance.[8]

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scientific texts.[29] Thus, instructors should try to integrate academic vocabulary and topics specific to college-level history and science courses into discussions, writing topics, and readings.

Digital Teaching Strategies

With recent technological advances, many developmental courses have been taught partially or fully online for many years. Some courses integrate online features (e.g., discussion boards and online chats often found through common university platforms such as Blackboard, Canvas, and iCollege) and use programs (e.g., Google Docs) for live peer editing of writing and feedback as well as social media platforms to connect learners (e.g., Microsoft Teams, Slack channels, WhatsApp). For instance, in one study an instructor used a private Facebook page for a developmental writing course; compared with a traditional course (without such technology), the Facebook-enhanced version was more successful in promoting confidence among students in writing and interacting about writing.[30] Digital tools can enhance collaboration among instructors and classmates as well as foster a sense of community, particularly if instructors embrace the many modalities that are inherent in the multiple literacies approach.

> # Learning mathematics requires greater literacy than is often assumed—especially for students for whom math has not been easy to digest.

Empirical research has also considered various digital technologies for enhancing reading and writing skills. The program iSTART (Interactive Strategy Training for Active Reading and Thinking), for example, provides instruction and practice in five of the reading comprehension strategies described above in the discrete skills section (monitoring comprehension, paraphrasing, bridging, elaborating, and predicting); iSTART has been iteratively modified and has shown promising gains in self-explanations of complex texts and reading comprehension for middle schoolers, high schoolers, postsecondary students, and struggling adult readers.[31]

Before moving on to mathematics, it's important to remember that although we have presented these strategies individually, effective instructors combine them as needed. For instance, comprehension strategies could be integrated into developmental courses using a combination of approaches. Instructors could model and scaffold how to paraphrase complex sections of different texts and then apply this to texts on topics of interest to students, vary the type of text (e.g., blog, newspaper article, passage), and/or vary the content area of the texts (e.g., science, history). In addition, for students who need even more practice, instructors could consider offering resources such as ThinkingStorm (in particular for writing feedback, thinkingstorm.com) or MyLab (available for self-paced reading and writing as well as math practice, pearsonmylabandmastering.com).* Building on the new literacies framework, instructors could also allow students more active roles in communicating, such as through writing reflections to a complex text—and those reflections might lead to ideas, elaborations, and further predictions related to the text.

Mathematics Instruction

Learning mathematics requires greater literacy than is often assumed—especially for students in developmental courses for whom math has not been easy to digest. Students need to be able to read effectively to understand concepts and questions (e.g., word problems, directions), to acquire procedural knowledge (understanding mathematical functions, operations, symbols, and rules), and to apply the appropriate strategies. Educators can help students develop skills to move their understanding from concrete to abstract. For example, students may have developed an understanding of specific symbols and functions (e.g., percentages [%]), and instructors can help students learn to express statements as mathematical operations (e.g., convert word problems into solvable equations, such as "What is the total amount of *simple* interest (in dollars) accrued on \$4,832 at a yearly rate of 5.5% over 4 years?" translates to 4,832 x 0.055 x 4, which equals \$1,063.04). Research specific to students enrolled in either developmental math courses or college-level math courses finds scaffolding is particularly effective in breaking down complex strategies and rules (e.g., mathematical proofs) into explicit steps. It also allows students greater autonomy as they learn to apply different methods.[32] Instructors can gradually lessen their role, providing hints and other partial supports as students continue to progress in their understanding and gain independence.

Scaffolding that is gradually removed also discourages rote memorization of mathematical steps; instead, it encourages students to articulate and work through problem-solving strategies. Some research has suggested that rote memorization of rules and formulas may be ineffective because students may not be developing the critical-thinking skills and knowledge necessary to form connections among mathematical concepts.[33]

Developmental mathematics instruction needs to be engaging and accessible. The following are some evidence-based instructional strategies to support students in these courses:

- Provide *worked examples*—which are problems that are already solved in an explicit, step-by-step way—with scaffolding,[34] enabling students to feel more comfortable and confident in their math abilities. Consider scaffolding learning to address areas of perceived weakness by adding an additional week of learning and reviewing foundational math skills—with worked examples and problems for students to

*Most of the widely available programs are based on research but have not been empirically tested, so we encourage instructors to periodically search for stronger resources.

solve—so students can build toward more complex topics at a comfortable pace. Throughout the course, reserve time to address mathematical concepts that students struggle with and need much more scaffolding and repetition to master. Instructors need patience and flexibility to come up with creative ways to reconceptualize and reteach mathematical topics that students persistently find challenging.

- Use tools (e.g., graphing calculators) and visuals (e.g., graphing paper, flash cards) to enhance learning concepts—but discourage solely relying on a calculator for all basic calculations.[35] For example, it is helpful to use a graphing calculator to quickly and accurately visualize graphs based on linear and quadratic equations, but many students may not learn the underlying math concepts if they never plot the points and draw the graphs by hand. Tools should be used to save time, not to substitute for understanding.
- Consider using manipulatives, such as blocks or other concrete objects, when introducing discrete or abstract mathematical concepts. A demonstrative example of this would be using a staircase when teaching slope.[36] Although manipulatives tend to be popular and can increase understanding, they can also be counterproductive if they do not help draw attention to key concepts. By explaining the manipulative and how it relates to the mathematical idea, instructors increase the likelihood of the manipulative being helpful.[37]
- Offer self-directed learning opportunities that are self-paced for further remediation while also providing supplemental instruction and creating opportunities for peer support.[38] In addition, use self-pacing for acceleration. Let students work ahead if desired and allow for multiple opportunities to master skills.
- Contextualize instruction by providing real-life examples.[39] This promotes transfer to the outside world and across classes. Whenever possible, ground exercises and assignments in authentic situations or set up real problems to be solved. For example, students may appreciate incorporating financial literacy into developmental mathematics courses (e.g., learning spreadsheets, balancing a checkbook, calculating percentages for tips, projecting retirement expenses).
- Allow students to create their own data sets and problems to solve. For example, students could use a bouncing ball to collect data on rebound heights and graph relationships,[40] or they could develop a survey to determine students' views on a topic, administer the survey to collect data, and develop a variety of charts to present their findings.

Combating Math Anxiety

Although anxiety about learning exists in developmental reading and writing courses, math anxiety is a particularly important issue to address. In fact, it is estimated that approximately 80 percent of community college students and 25 percent of four-year college or university students taking mathematics courses struggle with moderate to high math anxiety.[41] Math anxiety can decrease performance in math courses, as well as performance on placement exams into developmental courses (resulting in students who do not actually need a developmental course being required to take one).[42] Further, there is some evidence that female students may need more support, as they may exhibit higher levels of math anxiety compared with male students.[43]

Some strategies that developmental mathematics instructors may want to consider to combat math anxiety include:

- Acknowledge anxiety and fear early on in the course to help normalize the uncomfortable aspects of the learning process.[44] Instructors may even share their own stories of overcoming math anxiety to model perseverance.[45]
- Cultivate fearlessness by establishing an open, collaborative, and participatory classroom.[46] Allow students to work together, share resources, and hold each other accountable through classroom partnerships.
- Foster self-monitoring by acknowledging progress. For example, have students set goals, plan steps, and identify barriers as well as supports.[47] Then, have students monitor their progress through the learning management systems (e.g., Blackboard, D2L, MyLab Math). Provide motivational feedback that includes the tracking of progress in terms of percentage of content mastered or improvement of skill level.[48]

It is important to note that there is no one-size-fits-all instructional approach to developmental education. We encourage instructors to apply a broad array of strategies that bridge different content areas and meet students' unique needs. We also hope instructors will consider integrating motivational aspects (e.g., goal setting, interests, personal experiences) into discussions, assignments, and learning—especially in online courses. □

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