



How to Smooth the Transition
from Middle School to High
School in Mathematics and the
Sciences:
Teachers' Voice

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There is a gap between middle school and high school with respect to the study of mathematics and sciences. In middle school, many students study mathematics in a high-ability grouping but in high school, a significant number of them do not manage to successfully study mathematics at the high, five-unit level. In the sciences, the physics chapter taught in middle school does not function as a springboard into a physics major in high school.

At the request of the Trump Foundation, we had discussions with teachers in these subject areas in order to understand how they explain this disparity and we listened to their insights regarding steps that should and can be taken to reduce the gap. We conducted focus groups and in-depth interviews both with teachers and with other professionals in the school and in the supervision and training departments.

Mathematics

Teachers of middle school mathematics maintain that the age characteristics of the students and the large gaps between them require teaching of a different sort than in high school. The students have anxieties about mathematics and their motivation is low and therefore the teachers must bring them to the same starting point, deal with classroom management and focus on enhancing their study habits. This, in their opinion, is the main emphasis – actual and desired – of middle school teaching and learning.

The teachers note that middle school has no pressure of matriculation exams and therefore they should have more time to dive more deeply into and expand the students' thinking, passion and enthusiasm. However, they stress, that the eighth grade achievement tests, the MEITZAV (Hebrew acronym for Growth and Effectiveness Measures for Schools), make it necessary for them to focus on covering material, technical knowledge and procedural fluency, and they therefore find it difficult to follow through on what they believe should be the focus of learning.

The teachers report that while they identify with the values and content of the new curriculum, which encourages thinking, and the use of the spiral approach and the integrative approach, their teaching tends not to follow along those lines. They prefer to give the students a solid basis of knowledge, which builds their ability, and successful experiences that build their confidence. In addition, they note that the curriculum is difficult to teach and the MEITZAV tests are not aligned with it.

The middle school teachers further report that they are not familiar with the high school curriculum. They express the reservation that they would not be able to understand it completely, in particular the five-unit track. They say that their professional development is not conducted together with high school teachers and that there is no expectation or structure in the school that would support continuity between middle and high school.

The middle school teachers are aware that their students experience shock when they enter high school. They note that the level of requirements rises sharply, the pace is much faster, and therefore many students drop down to lower level classes. Nonetheless, they are not convinced that it is possible or desirable to change the situation, except for a change that could be made in ninth grade, when students are already more prepared to make an effort.

In their opinion, many students also drop down because there is no correlation between the high-ability grouping in middle school and the five-unit study track in high school. Many students are assigned to the high-ability grouping so as to give them an opportunity, or because their parents' pressure them and the school that they would be placed there. The teachers note that they do not know how to objectively diagnose their students' abilities since the system does not offer an external individual comparison test.

The teachers recommend starting a public initiative that would create momentum for investing and excelling in middle school mathematics, and which would place them on the same footing as teachers of five-units of mathematics. Joint frameworks for professional development for middle and high school mathematics teachers should be developed in order to focus on 9th grade students. In addition, they propose to establish a support system for students in schools, to appoint a "continuity coordinator" in the school, and adapt the MEITZAV exam to the new curriculum.

The Sciences

Science teachers say that they do not work in collaboration with physics teachers in high schools. They do not see the need for continuity between the two areas and note that the curricula were not created on a continuum. The school has no expectation for them to be on a continuum with high school studies. Even the physics teachers do not attribute importance to the content learned in middle school and teach the subject from scratch.

The middle school science teachers do not perceive their role as preparing students for a science major in high school. They view their role as exposing students to scientific and research thinking. They chose to teach owing to the belief that scientific thinking is the basis for world progress. In their opinion, choosing a science major is driven by the student's and his or her parents' practical considerations and not necessarily out of love of science.

The science teachers note that they do not specialize in physics and are not attracted to the subject and report that in any case, the curriculum is overloaded. As a result, the physics chapter in the middle school science curriculum is rather neglected and only a few students choose this major. At the same time, science teachers are not interested in having high school physics teachers step into their shoes and teach the chapter on physics.

In contrast, the physics teachers are divided into two: Those who believe it is preferable if physics weren't taught at all in middle school, and those who point to ninth grade as the year knowledge and skills in physics can be built. In their opinion, physics teachers who are able to teach that age group in an experiential manner are the ones it would be desirable to have teach the physics chapter, but starting only in ninth grade.