

Issues in Infrastructuring OST STEM Learning for Selective College Admissions

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Abstract: We report findings from interviews with college admissions personnel (CAP) as part of a larger infrastructure project examining opportunities to enhance the value of out-of-school time (OST) STEM learning in the U.S. college application review and admissions process. Our findings report on how CAP employ holistic review practices with information on both formal and OST learning experiences in the context of STEM admissions to render admissions decisions.

Introduction: Expanding the college admissions infrastructure

Our focus in this study is to explore the dimensions of the existing infrastructure of college admissions and to better understand how the existing infrastructure affords *some* students admission to selective colleges and universities in the United States but not others. Following Star and Ruhleder (1996), and later Penuel (2018), we understand infrastructure to be primarily relational. As such, we study infrastructure by examining the materials, standards, and work practices that support coordinated and distributed work with diverse stakeholder groups: in this study, the context of holistic review in selective college admissions in U.S. colleges and universities. This study builds off previous work by Cederquist, Fishman and Teasley (2019) which explored the potential of digital credentials as an innovative college admissions data source. This study expands our understanding of how college admissions professionals (CAP) make holistic admissions decisions and the role information on out-of-school time (OST) learning plays in selective admissions with a focus on access to STEM programs in post-secondary education. Through this work we are developing a platform (a kind of mastery-based record of OST learning) in partnership with the Mastery Transcript Consortium (MTC), OST program providers, and OST students and their families, to document the learning occurring at these sites. Our findings point to the potential benefits and challenges of incorporating mastery-based transcripts of OST learning into the college admissions process and unique challenges to inclusiveness presented by STEM admissions standards and practices.

Methods and participants

This is a qualitative study of how CAP conduct holistic review and the information they use to understand readiness for learning at their institution. We recruited 12 participants using snowball sampling methods: all have first-hand experience reviewing college application materials and making holistic admissions decisions in real admissions scenarios. The participants represent a range of institution types: private liberal arts colleges (n=4) and both public and private research universities (n=8). The institutions also represent a range of selective (n=8) and open (n=4) institutions (selective meaning a 60% admission rate or lower). Our sample size limits the generalizability of our findings, but our objective in this study has been to surface issues for future inquiry.

Conversations with participants followed a semi-structured interview protocol and addressed the following topics: 1) participant roles and responsibilities, 2) how CAP identify promising applicants in undergraduate admissions, 3) how information on formal and informal (OST) learning is used in holistic review, and 4) how STEM readiness standards influence holistic review. Data collection consisted of audio and video recordings of interviews and digital transcripts autogenerated by the video-conferencing platform. We prepared data for analysis by cross-referencing audio recordings with written transcripts to correct transcription errors. Data cleaning coincided with creating content logs for each interview. Content logs allowed us to document our initial reflections on each interview. We inductively coded both content logs and transcripts in an iterative fashion to develop emergent themes into a codebook that will guide future rounds of inquiry and design work.

Findings and discussion

CAP review files for evidence of academic and nonacademic fit. A judgment of academic fit is made from verifiable curricular information reported by the applicant's secondary school: academic transcripts and standardized test scores. CAP use school profiles and personal knowledge of specific schools to contextualize academic rigor. Nonacademic fit is understood through information submitted by an applicant or someone in their network: personal essays and letters of recommendation. When discussing OST learning, CAP often referenced lists of "extracurricular" activities produced by the Common App, a platform that allows students to scale the

submission of applications through a common portal, an affordance CAP believe has further complicated review: i.e., as application submission increases, quality decreases. Finally, some admissions systems allow students to submit their own supplemental information: e.g., research reports or creative writing.

Time and application volume are common factors that interact within holistic review. Standardized academic transcripts afford quick analysis and comparison between applicants. When applicants attend the same school, comparison is quite straightforward. When transcripts vary in format, curricula, and reporting metrics, comparison becomes more difficult. The opacity of grades further complicates understanding what students know: i.e., what is the difference between an A and an A- in terms of effort? Limited time also means CAP usually do not review supplemental student work. In addition to not having time, CAP believed they do not have the content knowledge to make informed judgements on the quality of the work. Nonetheless, student work was often described as a strong signal of student passion, interest, and character.

Trust in data sources and concerns of equity influence how CAP understand nonacademic fit. Because essays, extracurricular lists, and reference letters are the responsibility of the applicant, CAP view this information as less reliable than academic information as students have control on what to include, exclude, and how to frame achievement. Extracurricular lists are read to understand the motivation behind interests: alignment of engagement across activities is significant here. CAP believe a successful essay communicates an applicant's authenticity. This could be understood as engagement driven by intrinsic motivation, an understanding of self, or a commitment to others beyond oneself. CAP also acknowledge how inequitable access to resources that can improve college applications impacts the quality of student-submitted information.

We found that two factors primarily complicate STEM admissions: 1) a perception of STEM curricula as rigid and hierarchical pathways, and 2) competition for limited seats drives up admissions standards. When standards rise, the question becomes who merits admission most. This is difficult to answer, but it is encouraging that some CAP believe readiness for STEM can be understood through multiple dimensions, those both academic and nonacademic. Still, there is an understandable reluctance to admit students who do not meet minimum academic requirements. CAP acknowledged potential equity issues with emphasizing academic information in STEM admissions but note that a student's background information, essays, and letters of recommendation (when genuine) provide alternative sources of information on an applicant's potential for success. The objective then is to determine why the student did not meet academic standards and if they could still do the work. Evidence comes from school profiles, examples of managing personal responsibilities, evidence of engaging in group work, or evidence of a broader impact the student might have on the institution's community. Ultimately, when academic information is not *the* determining factor, but rather a floor that must be reached, holistic review is a matter of determining how each student *distinguishes themselves* as opposed to how each diverges from the academic norm.

Conclusion and future work

The next phase of research will include the development of a prototype mastery-based transcript. Design research work on the prototype will include human-centered design studies with CAP that mimic the holistic review process. Our goal in this design work is to understand issues of usability while being sensitive to the values underlying holistic review. Our findings suggest a focus on features that support sensemaking of student work and contextualizing extracurricular activities is needed, as these issues align with two features of mastery-based transcripts: the ability to embed and curate student work and the ability to capture work pursued outside formal classrooms.

References

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