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Video-based Supplemental Instruction as an Alternative to Traditional Developmental Courses

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**F. Kim Wilcox
Glen Jacobs**

University of Missouri-Kansas City



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Abstract

Video-based supplemental instruction (VSI) is a non-traditional course delivery system designed to improve developmental students' academic performance in difficult courses that typically have high failure and withdrawal rates. This paper describes the VSI model and examines data from VSI applications.

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Acknowledgments

We would like to thank the International Center for Supplemental Instruction and the SI leaders and supervisors around the world, whose theory and practice of Supplemental Instruction have contributed to our understanding of the program and its processes. By definition, SI is about the willingness to share experiences and expertise with others, so the collective wisdom of this group has become the giant on whose shoulders we stand.

1. Introduction

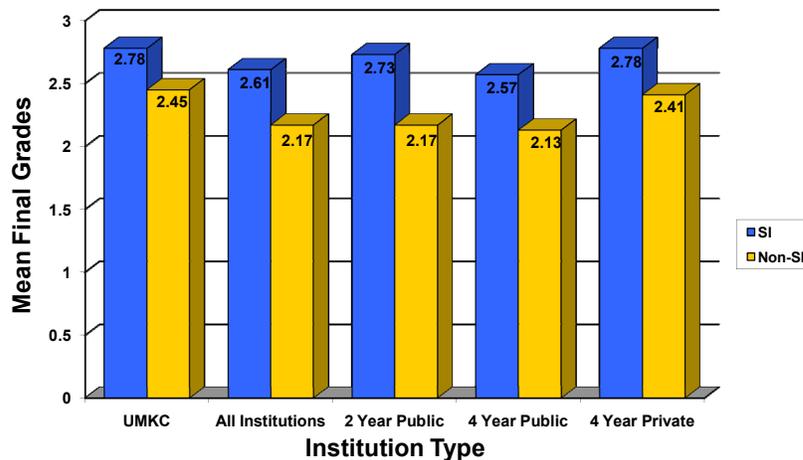
Developmental students are, by definition, students who find themselves underprepared to meet the expectations of higher education and are experiencing difficulty in adjusting to the academic or social demands of college. Students with academic adjustment difficulties are not prepared to meet the curricular expectations of higher education. Typically, these students enter postsecondary education with insufficient preparation in specific subject areas, such as reading, math, and science (Tinto, 1987). Social adjustment difficulties have to do with less tangible (but equally important) issues related to personal discipline (i.e., poor class attendance or weak study habits), the degree to which students feel a connection to or are identified with the institution, and the development of interpersonal relationships within the institution (Gardner, Jewler, & Barefoot, 1992; Astin, 1993). This paper explores a programmatic (Video-based Supplemental Instruction) approach that attempts to address each of the above issues for developmental students. It begins with a discussion of Supplemental Instruction (SI), an academic support program that provides peer tutoring for students enrolled in historically difficult courses, and then provides an overview and data for Video-based Supplemental Instruction (VSI), a variation of SI that was specifically designed for developmental populations.

2. Supplemental Instruction (SI)

Supplemental Instruction (SI) is an academic support program that is specifically attached to historically difficult courses (typically those with 30% or higher failure or withdrawal rates). SI works by organizing peer-facilitated study sessions for students enrolled in these courses. SI study sessions are typically conducted three or more times each week and are facilitated by a student, the SI leader, who has previously successfully completed the targeted course. Unlike traditional recitation sessions, these study sessions are designed to be interactive and participatory for the students who attend them. The SI leader receives training in how to organize study sessions, and the goal of the leader is to keep students on task while not assuming the role of faculty or necessarily functioning as a course content expert (Arendale, 1994). The SI leader avoids “relecturing” to the students by encouraging them to participate in discussions or activities that require them to draw upon their own understandings (or even misunderstandings) of the course material as it was presented by the professor during regular class sessions (Wilcox & Jacobs, 2009; Martin & Arendale, 1992; Blanc, DeBuhr, & Martin, 1983).

National data studies conducted by the University of Missouri-Kansas City (UMKC) over several years (2003–09) at 48 institutions (two-year public and private, four-year public and private) indicate that students ($n = 266,496$) who participate in SI achieve higher mean course grade averages than students enrolled in the target courses who elect not to participate in SI sessions. Figure 1 below separates SI and non-SI participants by intuitional type and reports mean grade point averages for SI and non-SI participants ($p < .001$). Institutions that provided data for this report attended a three-day UMKC workshop on SI and then volunteered to collect data from their own replicated programs based on the UMKC model. It is important to note that there may have been variations or adaptations to the model by these schools and that the data does not include institutions that may have attended the workshop but did not opt to report their data for the study.

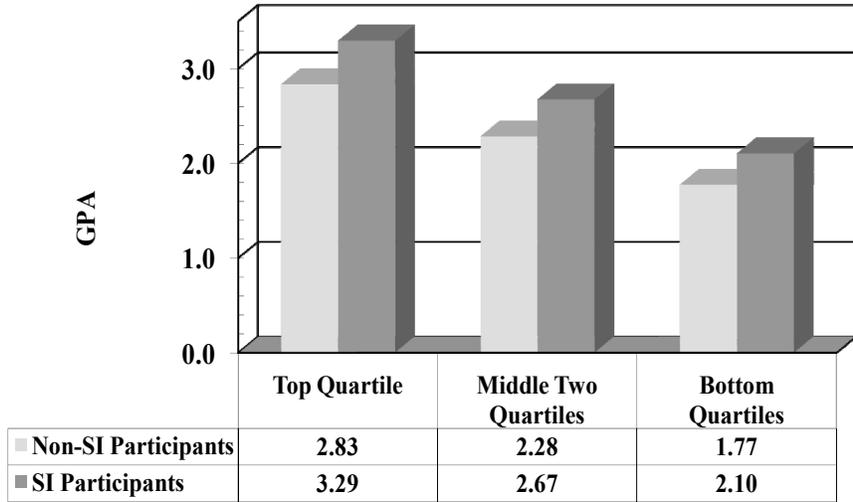
Figure 1: Mean Final Grades of SI and Non-SI Participants Separated by Institution Type



Data source: UMKC VSI Program, Fall 2003–Fall 2009. Results from 2106 courses at 48 institutions, $n = 266,496$ students.

In the above data, participation by students in SI study sessions was voluntary. While students who participated in SI sessions earned higher mean course grades (about one-half letter grade, $p < .001$), it is possible that the self-selection process might affect SI and non-SI success rates. Were the students who attended SI sessions academic profiles similar to those students who elected not to attend, or were only the “best” students attending SI sessions? Researchers attempted to address this issue in part by conducting additional studies that looked at data for SI and non-SI populations using ACT scores to control for academic preparedness. Figure 2 compares achievement by SI and non-SI populations by average ACT scores. It compares the academic performance of SI participants and non-participants at the upper, middle, and lower quartiles of ACT scores. Within these respective quartiles, SI participants outperform their non-SI counterparts in course mean grade point averages by about one-half letter grade.

Figure 2: Mean Final Course Grades of SI and Non-SI Students by Level of Prior Achievement



Data source: UMKC Supplemental Instruction Program, $n = 1,503$ students, Winter/Spring 2003.

3. SI and VSI for Developmental Courses

SI, as an academic support program and strategy for assisting developmental students, has not been able to demonstrate the success in developmental courses that it reports for regular credit-bearing courses. The exact reasons why SI has been less effective in developmental courses have not been researched, but institutions that have attempted to support developmental courses with SI report low student attendance (usually attributed to lack of student motivation) at SI review sessions. As a result, SI has rarely been attached to developmental courses because it is not cost-effective to offer SI in courses where students elect not to attend the sessions. Video-based Supplemental Instruction (VSI) provides an alternative way of structuring SI activities into a course designed for developmental students by increasing the time students attend class and integrating SI directly into the course. VSI is a non-traditional approach because historically, students enroll in developmental courses and then, after successfully completing them, move on to regular credit-bearing courses. VSI combines the developmental course and the corresponding regular-credit course into a single unit, using SI-like activities as a developmental tool for underprepared students.

4. Video-based Supplemental Instruction (VSI)

Video-based Supplemental Instruction (VSI) is a course delivery system designed to help developmental students succeed in courses with historically high failure or withdrawal rates (grades of D, F, or W). It is a non-traditional approach to developmental education in that students are not required to enroll in a developmental course and instead enroll a regular course that has additional developmental components attached to it. Typically, institutions test and place students into developmental courses at two- and four-year colleges according to individual state mandates after comprehensive evaluations of these courses have been made (Hurley, 2000). They identify courses where students are experiencing academic difficulty and then provide remediation for those students by enrolling them in a non-credit-bearing developmental course with the expectation that the skills developed in the developmental course will transfer to a regular core-curriculum course counterpart. VSI reduces this two-step process to a one-step process by adding the developmental part of the course to a regular credit-bearing course, enrolling developmental students in this special course section. Developmental education is provided in *the context of regular credit-bearing course* rather than adjunct or prerequisite to it.

Video-based Supplemental Instruction works by fully integrating SI-like review sessions into the structure of regular courses' meeting times rather than providing voluntary review sessions that meet outside of class. To accomplish this, *course meeting times are usually doubled*, and traditional lecture material is delivered through non-traditional (video or DVD) means that allow students to start and stop the lectures as needed, a key component of VSI.

In VSI courses, instructors record their lectures on videotape or DVD, and students enroll in a *video section* of the course. The course content delivered by the instructor is identical to the course content students would receive if they were enrolled in the professor's traditional lecture section of the course. A trained facilitator, rather than the course instructor, uses the taped lectures in conjunction with SI activities to provide the students with structured learning experiences that emphasize not only what to learn but also how to learn it. VSI differs from SI in that the review sessions are integrated into the course; this means that attendance at the SI session is mandatory. It also means that students both receive and review the course material through a series of specially designed collaborative learning activities. By using taped lectures rather than live lectures, the facilitator can regulate the flow of information to the developmental learner. Starting and stopping the recorded lectures allows the facilitator the opportunity to verify that students have comprehended one idea before moving on to the next. Students develop essential reading, learning, and study skills while they master course content in the context of the

content that would have been presented in a regular credit-bearing course. Students who pass the course receive college credit that fulfills degree requirements—which is important because students are more willing to enroll and motivated to succeed in courses that fulfill degree requirements than in traditional developmental non-credit courses that are prerequisites for regular credit courses. VSI courses require additional time to process course content, and students must be willing to meet for approximately twice as many hours each week for a VSI class than for a regular lecture section, for the same amount of credit as the regular course (typically 3 hours). The same grading standards apply to the VSI section as to the regular lecture course. Testing and grading are done by the course instructor (the professor whose lectures are taped) rather than by the VSI facilitator. In summary, this is how colleges typically implement VSI in their courses:

1. Invite a respected instructor who teaches a historically difficult course into a recording studio to deliver an entire course for the video camera.
2. Edit the videos for clarity.
3. Enroll students in a special video/DVD section of the historically difficult course and arrange their schedules to accommodate extended class periods.
4. Find a facilitator who has mastery of the course material and train that person in techniques of collaborative learning.
5. Give the students and the facilitator a copy of the taped lectures, a television monitor, DVD players, a whiteboard, supplementary materials, and course manuals.
6. Ask the instructor to test and grade the video-based section as rigorously as the regular lecture section of the course.

Because VSI captures and manages a significant percentage of the students' study time, students are given the opportunity to develop skills in writing, notetaking, reading, and critical thinking while they master course content and skills for effective learning. An important part of the VSI facilitator's role is to check for understanding before allowing students to move on to the next concept. The principle ingredient in the VSI process is revealed when the facilitator pushes the stop button on the VCR or DVD player; this not only allows for additional time to process course material but also makes students immediately accountable for demonstrating an understanding of the material that was just presented. This way of managing the flow of information provides students time to form questions, observations, and opinions that are shared with fellow students in order to

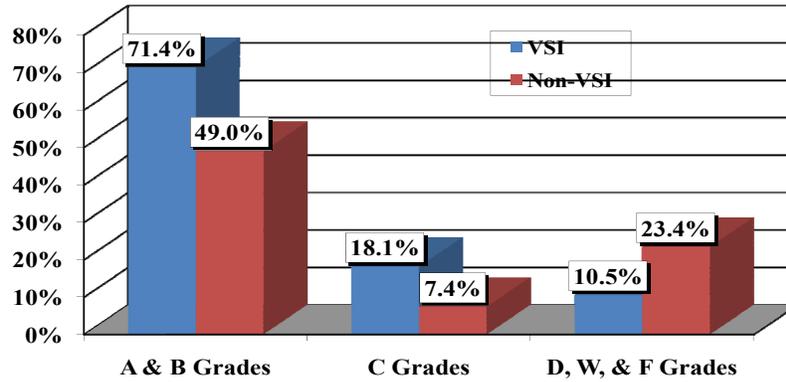
resolve confusion early in the learning process. A critical difference between the traditional class and the VSI class is that while students may and are often encouraged to ask questions during traditional classes, in VSI the facilitator doesn't wait for questions from students before checking to see if they can demonstrate an understanding of the material being presented.

When information is difficult to master, there is a greater need for students to have their study time managed until they are sufficiently skilled to tackle assignments on their own. The role of the facilitator is to model how to learn the material. Facilitators must check that students understand new material and become experts in finessing questions and answers from the VSI groups as students gain an understanding of how to take responsibility for their own learning. The difference between VSI and the traditional approach to postsecondary developmental education lies in the centrality of the students; student-to-student collaboration is central, not secondary, to the process:

1. *Students* conduct a preview of each lesson;
2. *Students* identify the key points for immediate discussion and review;
3. *Students* identify and resolve misunderstandings;
4. *Students* practice predicting and answering test questions; and
5. *Students* assure their own mastery as the course progresses.

Figure 3 compares the academic performance of VSI and non-VSI students at UMKC (1997–2004) enrolled in a historically difficult history course (a course where the D, F, and W rate exceeds 30%) by comparing mean grade point averages of students enrolled in a regular section of the course and students enrolled in a VSI section of the course. Students who enrolled in the VSI section of the course were primarily students who had previously demonstrated academic weaknesses (low grade point average, failure in the regular section of the course, academic probation, etc.) or had tested into developmental education (low ACT composite, reading, and English scores—see Figure 4). When considering these results, it is important to keep in mind that VSI students attend only the taped lectures and are given additional time on task for processing the material presented; they do not attend the regular lecture classes. The non-VSI students take the course from the same professor as the VSI students in a traditional lecture method and do not attend structured review sessions. On average, VSI students received higher rates of A, B, and C grades and lower rates of D, F and W grades than non-VSI students.

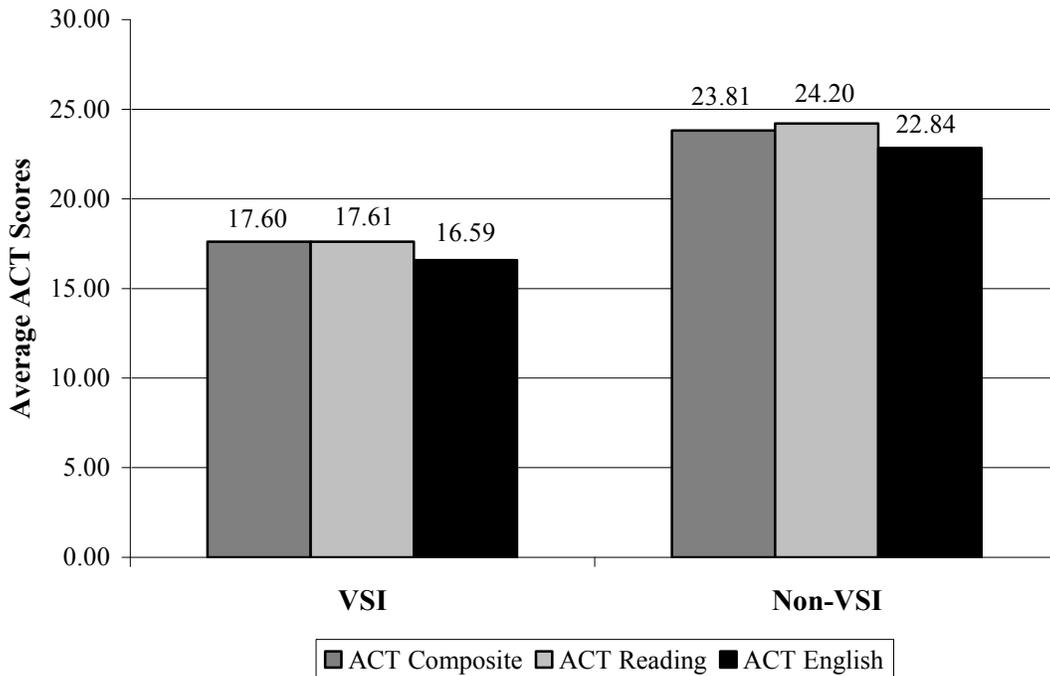
Figure 3: Grade Distributions for VSI and Non-VSI Participants in a History 201 Course



Data source: UMKC VSI Program, 1997–2004. Mean VSI GPA = 2.92, $n = 171$; mean non-VSI GPA = 2.50, $n = 1,630$.

VSI students were recruited and enrolled in the VSI class using methods that most universities use (testing and prior academic failures) to place remedial students into traditional developmental courses. VSI students were typically students whose academic profiles contain “at-risk” criteria or predict that they are at-risk in historically difficult courses. Students were not required but rather encouraged to enroll in VSI sections by academic advisors, faculty, and sometimes other students. Brochures that described the program were available to students, but recruiting methods and program descriptions were not standardized. There was also no attempt to prioritize or target specific populations, and it is not known how many students may have wanted to but were unable to enroll in VSI courses because of limited course enrollment sizes (typically around 18 students). Academic data presented in Figure 4 compares the ACT composite, reading, and English scores of UMKC VSI ($n = 171$) and non-VSI students ($n = 1,630$). VSI students averaged comparatively lower scores in each of these categories.

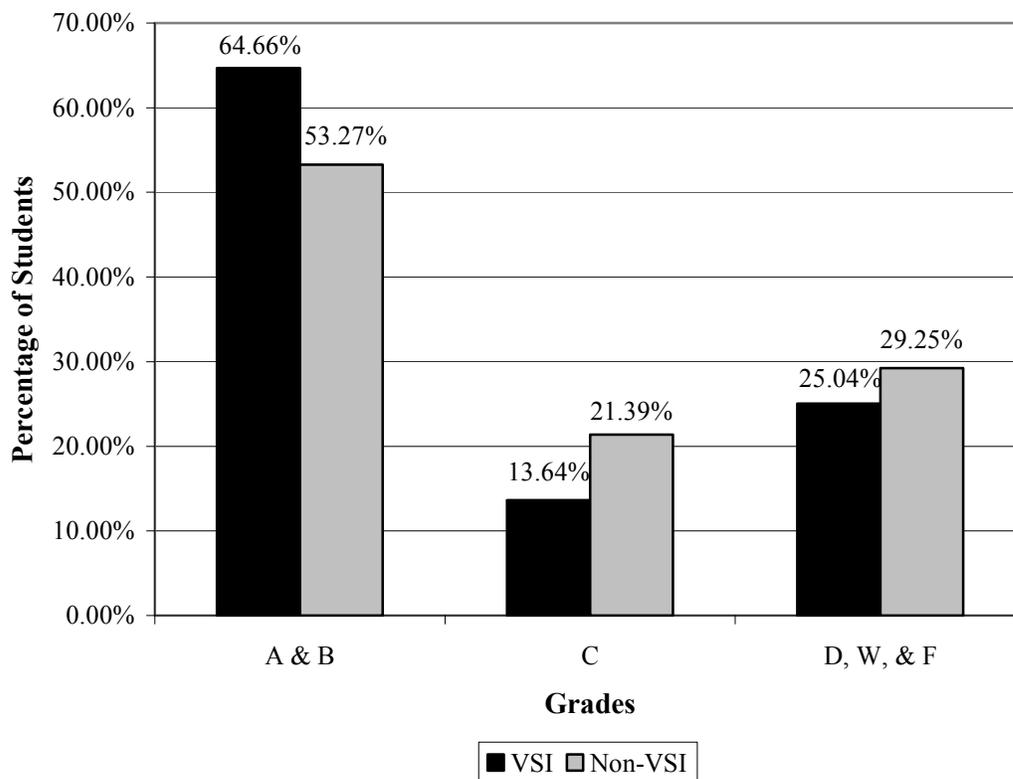
Figure 4: ACT Scores of VSI and Non-VSI Participants in History 201, Fall 1997–Fall 2004



Data source: UMKC VSI Program (VSI $n = 171$; non-VSI $n = 1,630$). Grades based on 4-point scale from 0 to 4. Standardized Test is the ACT test based on a scale from 0 to 36.

Figure 5 compares the academic performance of UMKC VSI ($n = 56$) and non-VSI students ($n = 975$) enrolled in a historically difficult chemistry course (1997–2004). Again the VSI students attended the VSI section of the course, while the non-VSI students took the course in a traditional lecture method. VSI students had higher rates of A, B, and C grades as well as lower rates of D, F, and W grades.

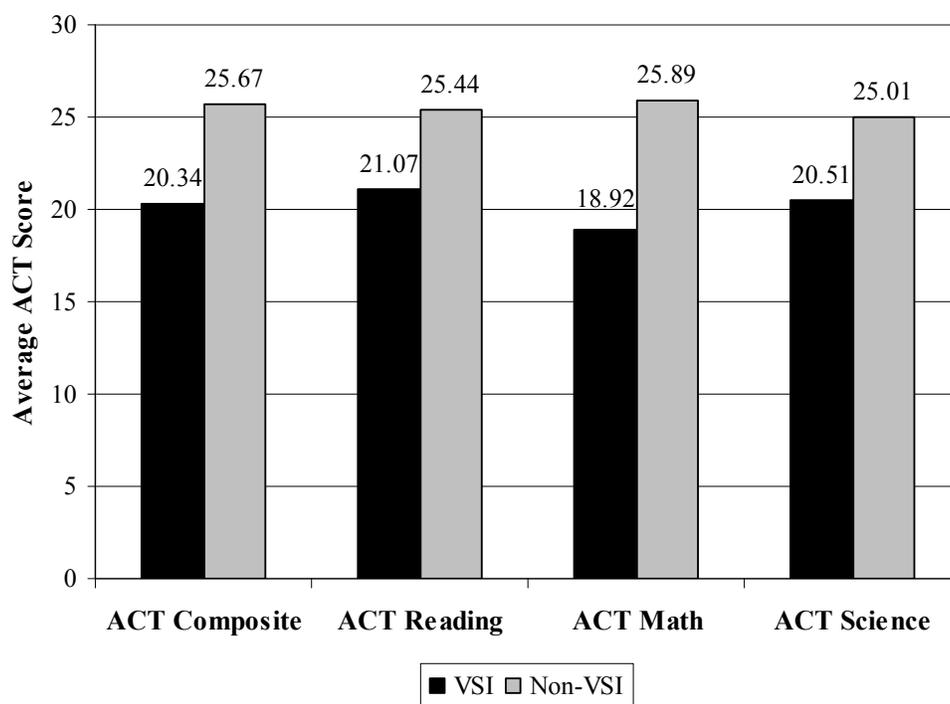
Figure 5: Grade Distributions for VSI and Non-VSI Participants in a Chemistry 211 Course, Fall 1997–Fall 2004



Data source: UMKC VSI Program (VSI $n = 56$; non-VSI $n = 975$).

Figure 6 compares ACT composite, reading, math, and science scores of VSI and non-VSI students taking the same course. Typically, students enrolled in VSI courses had much lower ACT scores in the areas of reading, math, science, and lower overall composite scores compared to students enrolled in the regular section of the course. VSI students' overall course mean grade point averages were also higher.

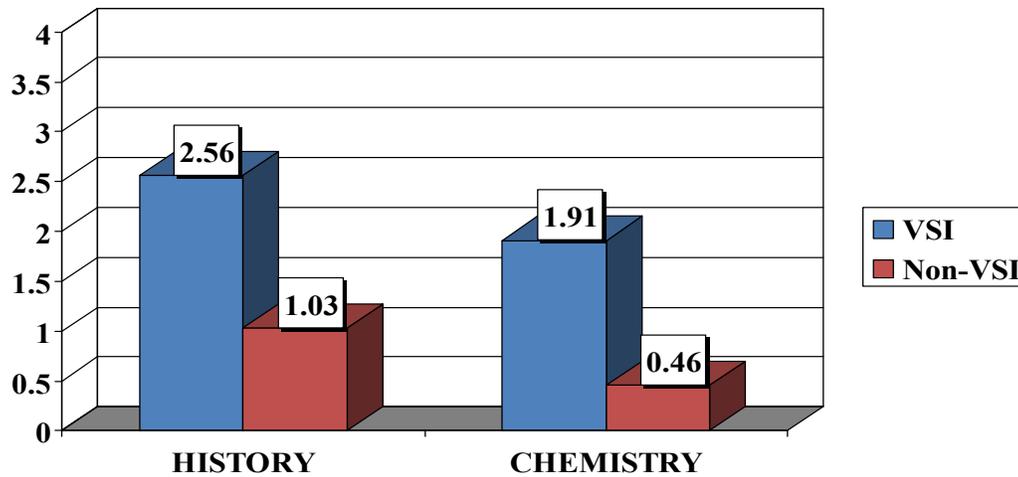
Figure 6: ACT Scores of VSI and Non-VSI Participants in Chemistry 211, Fall 1997–Fall 2004



Data source: UMKC VSI Program (VSI $n = 56$; non-VSI $n = 975$). Standardized Test is the ACT test based on a scale from 0 to 36.

The academic abilities of VSI and non-VSI students can also be compared based on academic status, or whether students had been placed on academic probation before they enrolled in the VSI or non-VSI format of a given course. Figure 7 compares students from history and chemistry courses (both VSI and non-VSI students who had been placed on academic probation). VSI students had significantly higher mean grade point averages than their non-VSI counterparts.

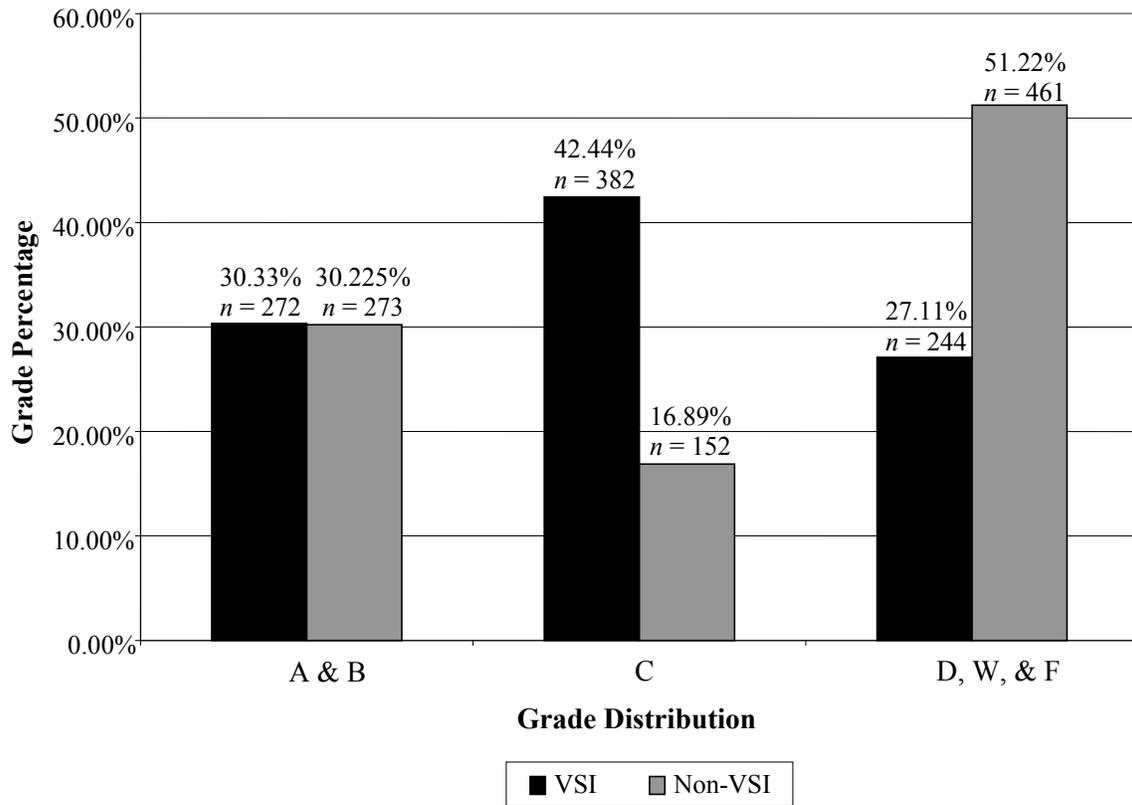
Figure 7: Academic Performance of VSI and Non-VSI Students on Academic Probation in History 201 (1992–1997) and Chemistry 211(1995–1997)



Data source: UMKC VSI Program. GPA is based on 4-point scale from 0 to 4.

Figure 8 provides data regarding the academic performance of VSI and non-VSI students enrolled in a historically difficult math course (College Algebra). VSI students had similar numbers of A and B grades, higher rates of C grades, and lower rates of D, F, and W grades compared to their non-VSI counterparts.

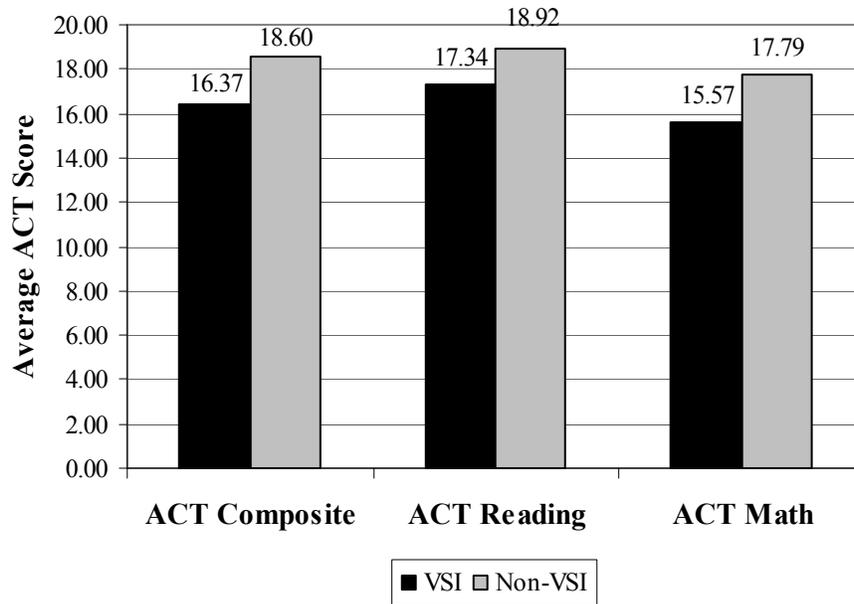
Figure 8: Grade Distributions for VSI and Non-VSI Participants in Math 110, Winter/Spring 1999–Fall 2004



Data source: UMKC VSI Program (A & B grades: VSI $n = 272$, non-VSI $n = 273$; C grades: VSI $n = 382$, non-VSI $n = 152$; D, W, & F grades: VSI $n = 244$, non-VSI $n = 461$).

Figure 9 compares ACT composite, reading, and math scores of each respective population of students enrolled in VSI and non-VSI math course.

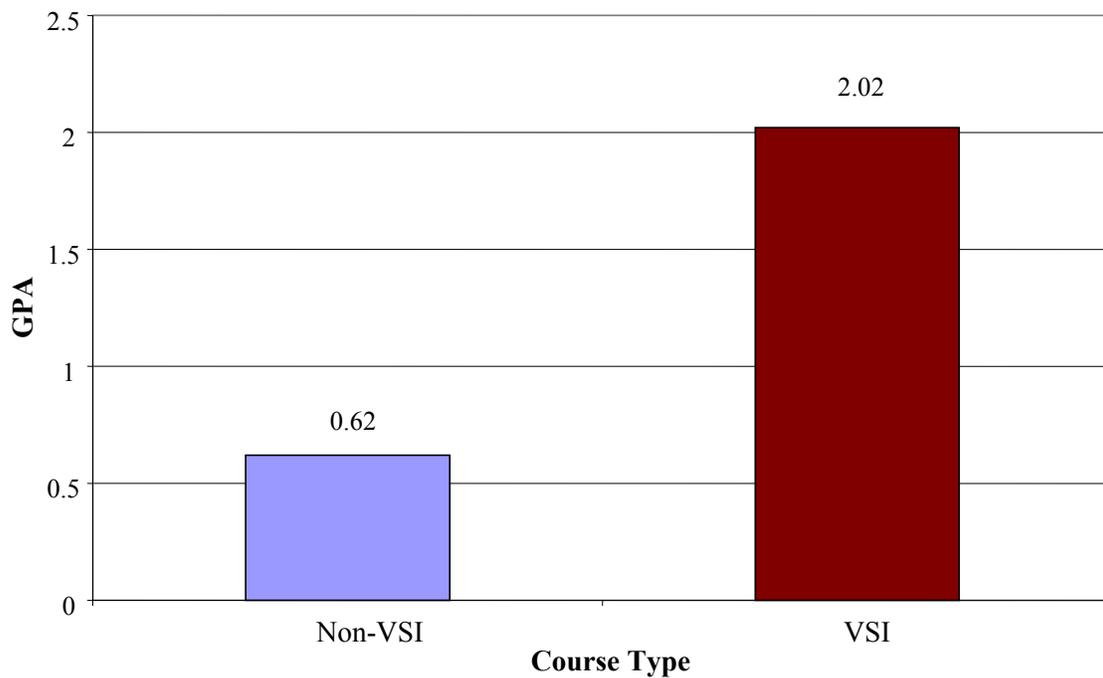
Figure 9: ACT Scores of VSI and Non-VSI Participants in Math 100, Fall 1999–Fall 2004



Data source: UMKC VSI Program (VSI $n = 30$, Non-VSI $n = 31$).

Figure 10 compares the academic performance of students on academic probation enrolled in a VSI and non-VSI math course. The mean grade point average for probationary students taking the VSI math course was 2.02; probationary students taking the same course in a traditional setting had a mean grade point average of 0.62.

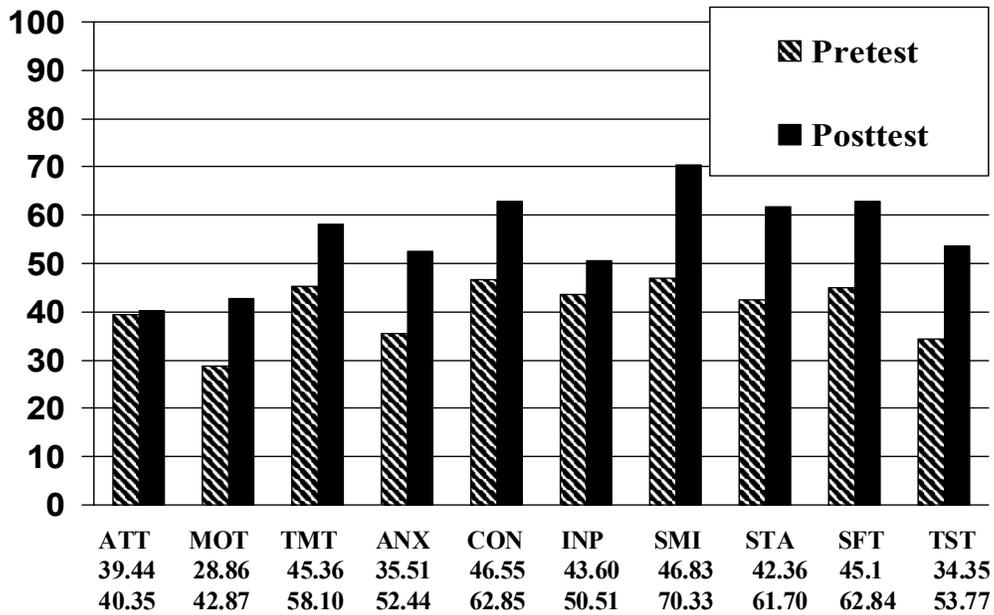
Figure 10: Mean Course Grades for VSI and Non-VSI Students on Academic Probation, Fall 1995–Winter 1999



Data source: UMKC VSI Program. Non-VSI $n = 173$; VSI $n = 27$.

Follow-up studies on UMKC VSI participants also showed an overall improvement in the study skills based on the LASSI study skills inventory (1992–1994). Figure 11 presents data from pretest and post-test scores.

Figure 11: Improved Performance on LASSI Study Skills Inventory

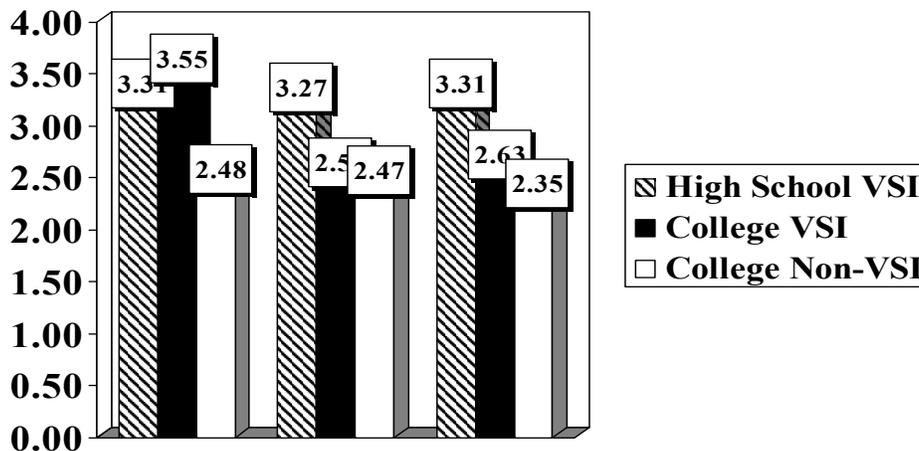


ATT = attitude and interest; MOT = motivation and self-discipline; TMT = time management; ANX = anxiety and worry; CON = concentration; INP = information processing; SMI = selecting main ideas; STA = support techniques and materials; SFT = self-testing; TST = test strategies.

Data source: UMKC VSI Program. Winter 1992–Fall 1994, untimed test, one form only, $n = 100$ ($p < .01$ except INP, where $p < .05$).

One early and unanticipated application of VSI emerged during its development as administrators in secondary education became interested in offering VSI courses as dual-enrollment, distance-education, college-preparation courses for college-bound students attending rural Missouri high schools. In this case, on-site high school teachers acted as VSI facilitators after receiving training at UMKC on how to conduct VSI classes. UMKC professors/instructors remained the professors of record and were responsible for providing the taped content lecture material as well as testing and grading students. Data from over thirty rural high schools indicate students were as successful as or more successful than students enrolled in on-campus VSI classes and on-campus non-VSI classes. The data presented in Figure 12 compare the mean grade point averages of three groups of students taking a History 201 course: high school VSI students ($n = 317$), college VSI students ($n = 297$), and college students taking the History 201 course through the traditional lecture method ($n = 268$). High school students were selected as college-bound honors students. High school teachers served as VSI course facilitators.

Figure 12: Comparison of High School VSI, College VSI, and College Non-VSI Mean Grade Point Averages



Data source: UMKC VSI Program 2002–2004 (High School VSI $n = 317$, College VSI $n = 297$, Non-VSI $n = 268$).

5. Areas for Future Research

There remains much research to be done concerning the effectiveness of VSI as an alternative to traditional remedial courses. It would be important to know if students taking VSI courses develop transferable skills that help them succeed in other courses. Data on subsequent course success were not collected here because success, in this case, was defined as completion of the regular credit-bearing course. Still, more information about the overall reenrollment and graduation rates of VSI students would help create a fuller picture of the effects of VSI enrollment. And more needs to be known about the degree to which VSI students retain course content, especially in comparison to students taking the course through traditional means.

Because students self-selected to enroll in VSI courses, more needs to be known about how students arrived at their decision, what role advisors, faculty, or other students played in the process, and how their expectations and understanding of the program contributed to or didn't contribute to their overall success. Future studies that include controls for self-selection bias through a combination of random assignment and student characteristics might provide a better basis for determining outcomes than controlling for student characteristics alone.

The cost-effectiveness of running a VSI program has also been an ongoing concern at UMKC. Students were not required to pay additional tuition to enroll in the VSI courses, and limited course sizes, as well as high start-up and operational costs, have led UMKC to cut back on VSI course offerings in the wake of state budget cuts.

Little is known about how the skills and training of VSI facilitators affect overall results or how facilitator participation in VSI contributes to their own development as teachers. Where VSI was offered in rural high schools, VSI facilitators (typically high school teachers without graduate degrees) anecdotally reported that facilitation of VSI courses was valuable as a faculty development tool. It would be important to know how and in what ways working in a VSI setting changed how they approached their own non-VSI courses as well as their understanding of the course content. (Johnson, Johnson, & Smith, 1991).

VSI, as a course-delivery system, also raises larger questions about the role of the traditional lecture in the delivery of course content. Arguably, the two most important characteristics of VSI—the ability of the student to control the flow of information and the ability of the facilitator to check for understanding before moving on—have important implications for classroom teaching or providing a methodology for online lectures. Mostly, traditional classroom lectures do not provide, as part of the built-in structure of the course,

“time to think” or process course material at a pace that the student helps to control. Students taking courses through traditional lecture methods are also rarely required to demonstrate that they understand the material as it is being presented.

Finally, there are lingering questions about the role that individual student motivation plays in the success rates of VSI classes. VSI students receive two or three times as much classroom time as students taking the course through traditional lectures, and enrollment sizes in VSI sections of the course are typically much smaller. To what degree are the positive results achieved by VSI students attributable to the increased amount of time spent on task? To what degree does student willingness to devote extra time to a class indicate a unique effort or non-typical motivation on the part of the students?

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