Effects of Online Homework in Face-to-Face Developmental Mathematics Courses

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Abstract

An investigation of the effects of online homework on the achievement of developmental mathematics students in face-to-face classes used a matched pair experimental design. Student and instructor opinions were explored with an opinion survey. Special analysis was done on data from Alaska Native and non-traditional students. A total of 423 students, six instructors and four levels of developmental mathematics were involved in the study. Findings suggested it is possible to expect similar or slightly higher achievement results with online homework. Varied opinions indicate the need for students have a choice of homework type.

Introduction

Developmental education provides opportunity for students who would otherwise not be able to attend higher education. However, students who take developmental coursework are less likely to finish their postsecondary education than those who do not take developmental coursework. Fewer than half of students who are referred to developmental coursework at community colleges actually complete the entire sequence to which they are referred (Baily, Jeong & Cho, 2009). Placing into a developmental course would have the obvious effect of lengthening the time to completion, and time to completion is correlated with completion rates (Clery, 2011). When students take and complete the developmental course sequence, there is a 50 to 55 percent chance they will complete the subsequent college level course (Baily et al., 2009).

Developmental education is targeted to improve both the academic and affective skills of students. Academic skills are the specified student learning outcomes for each course. Affective skills include positive attitudes, the abilities to work cooperatively, self-assess, manage time, persevere, and have self-confidence. Affective skills can be taught and these skills can mature.

Students' academic and affective skills can be influenced by pedagogical decisions on homework. Homework can be suggested or required, graded or ungraded. It can be assigned as online work or traditional paper and pencil format. The pedagogical decisions regarding homework format might impact students' ability to pass mathematics classes and to gain the affective skills needed to succeed in higher education.

Homework-achievement research has more often focused on K-12 education than at the college level. However, some of the issues are applicable to the college level setting and should be considered having implications for college mathematics. Meta-analysis done by Cooper, Jorgianne and Patall (2006) has shown there is a positive correlation between homework and achievement. Their analysis revealed time on homework is positively associated with class grade, and that homework has a more positive effect on grades 7-12 than it does on younger students. They suggest this is due to the maturity of study skills; thus implying there might be an even greater effect for college students. Weems (1998) found more students enrolled in developmental intermediate algebra classes earned A's when homework was collected. Ramdass & Zimmerman (2011) studied how homework can influence the development of self-regulation

skills, and discussed how requiring homework influences far more than achievement. Given the far-reaching influences of homework it is important to research the effectiveness of current practices and policies regarding homework.

The problem addressed in the current study is the high percentage of students who do not pass developmental mathematics classes. To address the high failure rates the current study investigates the relationship between online mathematics homework and academic achievement and the opinions of students and instructors about online homework.

Proportionate to the general population, non-traditional and minority students, including Alaska Natives, are more likely to enroll in developmental mathematics courses (Mulvey, 2009; Guillory, 2009). Additional analysis is done on these populations.

Online Homework in Post Secondary Mathematics

American Mathematical Association of Two Year Colleges (AMATYC, 2006), and the National Council for Teachers of Mathematics (NCTM, 2000) recommend the use of technology in the classroom. The National Association of Developmental Mathematics (Boylan, 2002) recommends the use of technology in moderation. When face-to-face instruction is supplemented with online homework technology is supporting the learning, and is not replacing the active teaching. All sections in this study were face-to-face, lecture style classes. Experimental sections used online homework, while control sections used paper homework.

Research on the use of online homework as it exists today has only been conducted for about a decade. Older research examined computer assisted learning that was implemented in a whole class computer lab setting (Pierce & Stacey, 2001). Limiting the search to research on the use of online mathematics homework at the post secondary level yielded a very small number of studies. Table 1 summarizes fifteen current studies.

Table 1: Summary of Research on the Use of Online Homework with College Mathematics

Authors	Sample size, Subject	Does online homework statistically produce greater achievement?	Positive student opinion
Carter (2004)	55, Basic Mathematics	No statistical difference	n/a
Hagerty and Smith (2005)	251, College algebra	yes	yes
Butler and Zerr (2005)	408, College algebra and calculus	n/a	yes
Jacobson (2006)	276, Prealgebra	No statistical difference	yes
Zerr (2007)	27, Calculus	yes	yes
Taylor (2008)	93, Intermediate algebra	yes	yes
Kodippili and Senaratne (2008)	72, College algebra	No statistical difference, p-value= .0638	n/a
Smolira (2008)	80, Finance	n/a	yes
Stillson and Nag (2009)	210, Remedial algebra	n/a	yes
Lenz (2010)	191, Math survey	No statistical difference	yes
Burch and Kuo (2010)	52, College algebra	Yes on exams, no on final exam	n/a
LaRose (2010)	665, 2nd semester calculus	No statistical difference	yes
Brewer and Becker (2010)	145, College algebra	No statistical difference overall, yes for low incoming skill	yes
Cox and Singer (2011)	87, Calculus	n/a	yes
Halcrow and Dunnigan (2012)	232, Calculus	Yes for one instructor, no for the other	yes

The current research indicated student opinion of online homework is favorable. A few studies also surveyed instructors and those results were generally favorable (Halcrow & Dunnigan, 2012; LaRose, 2010; Jacobson, 2006). Most studies did not compare the opinions of students who used online homework to the opinions of students that used paper homework.

There were inconsistent results regarding achievement. About half of the studies demonstrated a positive effect on achievement. The other half of the studies showed no significant difference in achievement when online homework was used. No studies found a negative effect. Most studies that did not find a statistical difference in achievement cited small sample size as the reason. In an effort to overcome this limitation, this study includes a larger number of sections (19 sections) of developmental math. However, a quick analysis on the fifteen previous studies produced no discernable pattern between sample size and statistical significance. For the five studies that analyzed achievement and had sample size less than 100: two found a positive effect, two found no effect and one had mixed results. For the five studies that analyzed achievement and had sample size more than 100: one found a positive effect, three found no effect, and one had mixed results.

Several of the studies used multiple instructors, as does the current study. Only one study analyzed how the different instructor factor interacted with the effect of online homework (Jacobson, 2006).

Two studies included multiple course levels (Smolira, 2008; Butler & Zerr, 2005), but only one of the studies analyzed how the course level interacted with the effect of online homework (Smolira, 2008). The current study will analyze how four different course levels interact with the effect of online homework.

Several of the studies looked at the backgrounds of the students (Zerr, 2007; Hagerty & Smith, 2005). Background factors included were gender, GPA, and ACT/SAT scores. But none of the studies analyzed the interaction of sub-populations with the effect of online homework. The current study will analyze how non-traditional status and Alaska Native status interact with the effect of online homework.

Methodology

The purpose of the study was to analyze the effects of online homework on achievement and to explore student and instructor opinions. There was a special focus on non-traditional and Alaska Native students. This study examined the following research questions:

Question 1: To what extent does online homework affect the achievement of students enrolled in developmental mathematics courses, as measured by a post-test, final course grade, and pass rates?

Four levels of developmental mathematics classes were involved: pre-algebra, beginning algebra, intermediate algebra, and intensive intermediate algebra. For this study six instructors taught a total nineteen sections. This study used an experimental design approach. Nine sections of developmental mathematics courses served as the control group (paper homework) and ten sections of developmental mathematics were assigned to the treatment group (online homework). Achievement was measured post-test, final course grade, and pass rates.

Question 2: What are student and instructor opinions regarding online homework?

An opinion survey was administered to both students and instructors. Results were compared between students in online homework sections and paper and pencil sections, and

between instructors and students. Separate analysis was done on data from Alaska Native and non-traditional students.

Participants

The study was conducted at a public, four-year university with an embedded community college component, located in Fairbanks, Alaska. The University of Alaska Fairbanks institutional profile (2014) indicates there are approximately 10,800 enrolled students. The median age of students is 25 years old.

Alaska Native/ American Indians comprise 19.7 percent of the student population at the university. In the current study Alaska Native status was self reported by students and comprised 21 percent of participants.

Students were considered non-traditional if they have two or more of the non-traditional characteristics as outlined by National Center for Education Statistics (NCES, 2012). Non-traditional students comprised 46 percent of participants.

The student participant sample (n= 423) came from those enrolled in the sections of the developmental mathematics sections taught Fall 2012. One of the instructors was also the researcher for this study. The researcher is aware of the potential for bias, and acted in a professional manner both as an instructor and as a researcher. Informed consent was obtained from study participants before the implementation of the research experiment.

Procedure

Sections of face-to-face developmental mathematics courses were assigned the use of online or paper homework prior to student registration. Ten sections used online homework and served as the experimental group. Nine sections used paper and pencil homework and served as the control group. Pre-algebra sections using online homework used the program *MyMathLab.* Beginning, intermediate and intensive intermediate algebra sections using online homework used the program *ALEKS (Assessment and Learning In Knowledge Spaces).* All sections sections counted homework for 30 percent of the final course grade. Efforts were made to have consistent expectations and implementation of online homework. For example due dates for homework, problems selected, number of attempts allowed and tool availability were consistent for all online homework sections. Similar efforts for consistency were made in the paper and pencil sections. Homework sets were similar in length and grading was comparable between the paper and pencil sections.

During the first week of instruction a pre-test was administered to measure a baseline of mathematical achievement. The post-test instruments were the common departmental comprehensive final exams for each course.

During the last week of instruction an opinion survey was administered to students and instructors. Students were asked to rank the following statements on how much they agree (5= strongly agree, 4=agree, 3=neutral, 2=disagree, 1=agree). The five questions were:

1. The homework for this class helped me learn the material.
2. The homework for this class helped my final grade in this course.
3. I did my homework for this class most of the time.
4. I believe doing homework is valuable.
5. I am satisfied with the homework format for this class (online for some students, and paper and pencil for other students).

The questions were slightly modified for the instructors. For example, the first question was "Online homework helped students learn the material."

Data Analysis Procedures

Statistical analysis was done in the computer program *R*, except as noted. The dependent variable was achievement as measured by post-test, final course grade and pass/fail rate. Homework type was the independent variable of main concern, but a total seven covariates considered: homework type, pre-test, course level, instructor, times per week class met, time of day, Alaska Native status and non-traditional status.

Analysis of variance (ANOVA), proportional odd modeling, multinomial logistic regression, and logistic regression were used depending on the variable type. The Wilcoxon Rank-Sum test was used to determine if the mean responses to the opinion survey were different between the online homework group and the paper homework group and between instructors and students. Model assumptions and goodness-of-fit tests were used to determine model adequacy. In general, without further specification, a p-value less than 0.05 indicated that the effect was statistically significant. If the interaction effect was significant, simple effect was investigated and p-value was adjusted using Bonferroni method for multiple comparisons.

During the modeling process it was discovered that not all the independent variables could be included in the fitted model. It was determined that predictor variable "Instructor" was highly correlated with two or more other predictor variables. The "Instructor" variable was removed from the models.

Results

The descriptive statistics are summarized in table 2.

Table 2: One-way frequency table, Categorical Variables

Variable		Frequency	Percentage
Native	No	307	78.52
	Yes	84	21.48
Course level	A	115	27.19
	B	94	22.22
	C	159	37.59
	D	55	13.00
Final course grade	A	84	19.86
	B	87	20.57
	C	88	20.80
	D	42	10.64
	F	69	16.31
	U	8	1.89
	W	42	9.23
Pass rate	Fail	156	37.59
	Pass	259	62.41
Instructor	A	110	26.00
	B	87	20.58
	C	30	7.09
	D	41	9.69
	E	108	25.53
	F	47	11.11
Non-traditional	No	210	53.57
	Yes	182	46.43
Time of day	Morning	208	49.17
	Afternoon	215	50.83

Times per week	2	120	28.37
	3	303	71.63

Post-Test

ANOVA was used to investigate the interaction effect of homework type and all the other variables on the dependent variable post-test. The F test based on the type III estimable functions for each effect was used to test if the effect of a term might be statistically significant, under the assumption that the sampled populations are normally distributed. For the interaction effects, the results of the F test indicate that the only significant effect was the interaction effect of homework type and course level. It was statistically significant at the 0.05 level (F (3, 284) = 4.33, p = 0.0053). This suggests that the effect of homework type on post-test scores depends on course level, and vice versa. Table 3 shows the estimated marginal means of post-test under each level of homework type by course level.

Table 3: Estimated marginal means of post-test under homework type X course level

Homework type	Course level	Estimated marginal means	Standard error
O	A	65.37	2.94
P	A	68.94	2.59
O	B	73.36	3.51
P	B	59.62	3.27
O	C	75.99	2.12
P	C	67.78	3.23
O	D	63.37	3.89
P	D	71.13	4.93

It appears that the effect of homework type:

- Under course level = "A", the effect of homework type on post-test was not statistically significant at the 0.05 level (F (1, 284) = 0.83, p = 1.000).
- Under course level = "B", the effect of homework type on post-test was statistically significant at the 0.05 level (F (1, 284) = 8.18, p = 0.018).
- Under course level = "C", the effect of homework type on post-test was not statistically significant at the 0.05 level (F (1, 284) = 4.52, p = 0.137).
- Under course level = "D", the effect of homework type on post-test was not statistically significant at the 0.05 level (F (1, 284) = 1.53, p = 0.870).

The main effect of homework type was not investigated since the interaction effect was statistically significant.

Final Course Grade

Analysis for final course grade was done in SAS, Statistical Analysis System. The dependent variable "Final Course Grade" had 5 levels: A, B, C, D and F (note that U and W were not used in the data analysis). Ordinal logistic regression (proportional odds model) was first used to investigate the main effects of the independent variables and the interaction effect of homework type and all the other variables on the dependent variable, final course grade. The score test for the proportional odds assumption suggests that the proportional odds assumption

has been violated ($p < 0.0001$). Thus, the model was fit using multinomial logistic regression for investigating the main effects of the independent variables and the interaction effect of homework type and all the other variables on the dependent variable, final course grade. The analysis of effects based on the Wald χ^2 test was used to determine if an effect was statistically significant. None of the interaction effects were statistically significant at the 0.05 level, so the main effects were considered. However, the main effect of homework was not significant either (χ^2 (4, N = 348) = 6.69, p = 0.1532).

Pass Rate

As pass rate was a categorical variable with two levels (0 = fail, 1 = pass), multiple logistic regression was used to investigate the main effects and the interaction effect of homework type and all the other variables on the dependent variable pass rate. The type 3 analysis of effects based on the Wald χ^2 test was used to determine if an effect was statistically significant. None of the interaction effects were statistically significant at the 0.05 level, so they were removed from the model and multiple logistic regression was used to investigate the main effect of homework type. The effect of homework type was not statistically significant at the 0.05 level (χ^2 (1, N = 382) = 0.23, p = 0.633).

Table 4 summarizes the statistical significance of the interaction of homework type with the covariates.

Table 4: P-Values of Statistical Significance of Interaction of HW type and Covariates on Dependent Variables

HW type interaction with:	Post-test	final course grade	pass rate
Pre-test	0.356	0.342	0.775
Course level	0.005*	0.060	0.158
Times per week	0.913	0.267	0.157
Time of day	0.112	0.109	0.269
Native	0.263	0.336	0.541
Non-traditional	0.897	0.062	0.072

*Statistically significant at 0.05 level

Opinion Survey

Student and instructor opinion surveys were administered during the last week of the semester. The Wilcoxon Rank-Sum Test was used to determine if the two samples differ in the mean ranks, while making no assumptions about the distribution of the data. Tables 5 and 6 summarize the mean responses and the p-values from the Wilcoxon Rank-Sum Test.

Table 5: Wilcoxon Test Results on Opinion Survey: Comparison of Online to Paper Homework: All Students

Statement	Mean online HW response	Mean paper HW response	Difference	P-value
1	4.175	4.421	-0.246	0.01352*
2	3.950	4.179	-0.229	0.06447
3	4.244	4.359	-0.115	0.325
4	4.176	4.347	-0.171	0.1118
5	3.906	4.500	-0.594	<.001*

*Statistically significant at 0.05 level

Table 6: Wilcoxon Test Results on Opinion Survey: Comparison of Students and Instructors: Online Homework

Statement	Mean instructor response	Mean student response	Difference	P-value
1	4.667	4.175	+0.492	0.1205
2	4.167	3.950	+0.217	0.7481
3	3.667	4.244	-0.577	0.0332*
4	4.833	4.176	+0.657	0.0368*
5	4.000	3.906	+0.094	0.8296

Alaska Native Students and Non-Traditional Students

The interaction effects of homework type and native status on post-test, final course grade and pass rates was not statistically significant. The interaction effects of homework type and non-traditional status on post-test, final course grade and pass rates was not statistically significant.

Table 7 summarizes the opinion survey data for Alaska Native students. None of the responses are statistically significant. Table 8 summarizes the data for non-traditional students.

Table 7: Wilcoxon Test Results on Opinion Survey: Comparison of Online to Paper Homework: Alaska Native Students

Statement	Mean online HW response (Native only)	Mean paper HW response (Native only)	Difference	P-value
1	4.133	4.286	-0.153	0.7976
2	3.667	3.964	-0.297	0.3836
3	3.900	4.107	-0.207	0.831
4	4.100	4.185	-0.085	0.8442
5	4.000	4.393	-0.393	0.2143

Table 8: Wilcoxon Test Results on Opinion Survey Comparison of Online to Paper Homework: Non Traditional Students

Statement	Mean online HW response (Non-traditional only)	Mean paper HW response (Non-traditional only)	Difference	P-value
1	4.291	4.525	-0.234	0.0728
2	3.958	4.339	-0.381	0.0167*
3	4.431	4.407	+0.024	0.8556
4	4.296	4.458	-0.162	0.191
5	4.111	4.603	-0.492	0.0079*

*Statistically significant at 0.05 level

Research Question 1: To what extent does online homework affect the achievement of students enrolled in developmental mathematics courses, as measured by a post-test, final course grade, and pass rates?

There was no significant main effect of homework type on final course grade or on the pass rate. However, the interaction effect of homework type and course level had a significant effect on post-test. This was the only interaction factor that had a significant effect on the three measures of achievement (post-test, final course grade, and pass rate). Upon further analysis, online homework has a positive effect on the post-test scores of beginning algebra. Online homework did not have a significant effect on the post-test scores of pre-algebra, intermediate algebra and intensive intermediate algebra.

Research Question 2: What are student and instructor opinions regarding online homework?

Significant differences were found on the opinion survey. In general, the mean responses were very favorable for online homework: 4.09 (SD=1.00), but they were also favorable for paper homework: 4.36 (SD=0.78). On the statements "homework for this class helped me learn the material" and "I am satisfied with the homework format for this class" students in paper homework sections felt more favorable than the online homework sections. Based on the analysis, it is possible that students have a slightly more favorable overall attitude toward paper homework.

Student and instructor responses were compared for sections using online homework. Instructors scored four out of five statements higher than students. Alaska Native students in paper homework sections scored every statement higher than those in online sections. However, none of the differences were significant. Non-traditional students in paper sections scored four out of five of the statements higher than those in online sections; two of the differences were significant.

Discussion

Online homework is becoming more prevalent in college mathematics courses. It provides a new way of doing homework. Resistance to change can negatively influence the opinions of students and instructors. The reduction in grading duties can have a positive effect on instructor opinions. Students and instructors express strong positive and strong negative opinions about online homework. Opinions matter, but so do achievement results. As a

developmental mathematics educator, this motivated the researcher to investigate the efficacy of online homework.

Current literature supports common sense. Homework is important (Cooper et al, 2006; Weems, 1998; Ramdass & Zimmerman, 2011). Feedback to students (including solution sets) might be more important then the actual homework (Gutarts & Bains, 2010). Busy teachers don't give enough feedback on homework. Often the feedback is just a cursory check to see if it is done, or grading of a few of the harder problems. Online homework can provide rich, instantaneous feedback. Worked examples, help-me-solve this, videos, links to the textbook and give-me-a-similar problem are examples of type of feedback given by online programs. Instant feedback encourages the rapid reattempt. Online homework may not raise test scores, but it has benefits over paper and pencil homework.

This study found higher achievement in one level of developmental mathematics when online homework was used. In the other three levels of developmental there was no significant difference in achievement. The post-test scores of beginning algebra students using online homework were statistically higher than those using paper homework. Four out of nineteen sections involved were beginning algebra and two instructors taught these sections. It is possible that the instructors for these sections did have an influence on the improved achievement. But since the instructor factor was highly correlated with other factors, it was impossible to look at the effects of this factor. One of the beginning algebra instructors reported that students this semester were an unusually low performing (both the online and paper groups). This may have skewed the data and results. It is possible that the topics taught in beginning algebra lend themselves more towards the right/ wrong feedback given by online homework. But if that was the case, one might expect it to be true for pre-algebra also.

In an effort to explain why there was a significant difference in the beginning algebra class the syllabi were analyzed. Beginning algebra was the only course level that did not give written feedback in the form of quizzes. It might be possible that without the benefit of this written feedback that the effect of online homework became significant.

Given an opinion survey students scored online homework *lower* than paper homework on all five statements. Two differences were statistically significant. In general, this could indicate that when all students are surveyed there is a preference for paper homework. But online homework did not receive low scores. In fact, the scores were high on both paper and online homework (ranging from 3.9 to 4.2 for online homework and from 4.2 to 4.5 for online homework).

Students scored the statements about homework lower than the instructors, but this isn't surprising. Students don't like homework. With student maturation comes an understanding and belief in the importance of homework. Developmental educators guide students to mathematical and affective skill maturity. Whatever the homework format quality feedback must be given. If online homework increases the quality of feedback then using it can influence students and help them develop affective and academic skills.

This study indicates that homework type does not have a significant effect on the achievement of non-traditional or Alaska Native students. Both groups might have a slight preference for paper homework, as indicated by their responses on the opinion survey.

Recommendations for Policy and Practice

Based on the finding of this study, online homework can be used with developmental mathematics students and expected achievement results should be similar to those obtained with

paper and pencil homework. The improved quality of online homework programs, the increased availability of open-source textbooks, support from websites such as *Khan Academy* and *You Tube,* and the significant cost of textbooks are reasons why online homework is likely to be used more and more in the future.

Access to electronic textbooks often comes with online homework programs. Print versions of textbooks are significantly more costly then electronic versions. Using online homework with electronic books provide a cost savings to the student. Online homework can provide rich instantaneous feedback, detailed explanations and immediate re-attempt of similar problems.

Online homework can provide consistent expectations from instructor to instructor. This may be an important consideration with departments that have a large number of contingent faculty.

As would be expected some students have a preference for paper versus online homework. Advisors and students should be aware of learning styles and preferences. When students register for classes they should know whether online or paper homework will be required. Taking this information into account can help students enroll in classes that are better suited to their learning styles. Different learning styles and preferences will influence attitude, which may in turn, influence achievement. As suggested by Kinney & Robertson (2003), students should have choices in their course selection and modes of instruction that support their learning styles. Universities should publicize which sections use online homework.

Recommendations for Future Research

LaRose (2010) hypothesized that it was *not* the homework format (online or paper) that made a difference in achievement, but it was the fact that the homework contributed to the course grade. Homework can be graded for correctness, for completion, for demonstration of understanding, or not graded at all. Gutarts and Bains (2010) hypothesized that feedback (even in the form of solutions sets) was the component that most affected achievement. Does receiving "credit" for homework improve achievement or does the actual feedback improve achievement? Future investigation should explore the effects of the written versus computerized feedback.

In the current study online homework had a significant effect on achievement in sections where there was not written feedback on quizzes. Does online homework have more of a positive effect when there is less written feedback? If so, then online homework might be a method of improving achievement when little written feedback is given.

The significance of the interaction between course level and homework type should be further explored. This study included four levels of developmental homework, but did not include college-level mathematics courses. Cooper, Jorgianne and Patall (2006) showed that homework has a more positive effect on grades 7-12 than it does on younger students. Is there a similar trend when comparing developmental level to college level mathematics?

Future studies should consider the independent variable of instructor. For reasons of statistical analysis the independent variable instructor was removed from the models. Therefore, no conclusions can be made about the effect of instructor/ homework type interaction on achievement. Future studies should focus more in the influence of the instructor. The instructor factor might be very significant.

Conclusions

The goal of developmental education is to help students succeed in their higher education goals. Developmental students are developing both academic and affective skills needed to engage in college level courses. Pedagogical decisions do have an effect on both academic and affective skills. Research like this helps higher education make decisions based on data and careful analysis, rather than on intuition, anecdotal observations, and unsupported feelings.

In this study student opinions about paper homework were slightly higher than opinions about online homework. Opinions can affect level of engagement and affective skills. To best serve students institutions of higher education should provide information about the use of online homework when students are registering for courses.

Research indicates homework has a positive effect on academic and affective skills. In this study sections online homework had similar or slightly higher achievement results as sections paper and pencil homework. This conclusion supports what other researchers have found (see Table 1). Instructors who choose this form of homework can continue to offer it knowing that in addition to its academic efficacy it has the added advantage of rapid and detailed feedback and gives students access to additional electronic resources not readily available with traditional homework.

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