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Internet-assisted versus traditional distance learning environments: factors affecting students' preferences

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Abstract

Factors related to students' selection of Internet-assisted vs. traditional distance learning environments (IDL vs. TDL) at the Open University of Israel were investigated. The two groups differed in their demographic variables, academic achievements and value priorities. The IDL group had a higher percentage of males, and a different age distribution. Students in the IDL group also had higher academic achievements: higher grades in Statistics, a higher grade point average, and a better knowledge of English. The groups also differed in their value priorities. The IDL group attributed higher importance to values that emphasize independence in thought and action, creativity and curiosity, and lower importance to values that emphasize maintenance of the status quo, and preference of what is familiar and well-organized. Theoretical, methodological and practical implications of the results are discussed.

Keywords: Adult learning; Computer-mediated communication; Distance education and telelearning; Distributed learning

1. Introduction

The Information age with its technological developments has strongly affected education in general and Higher Education in particular: learning has become an ongoing process, the learners population has grown, flexible learning is demanded (in time, place and pace), and easy accessibility to education is required.

Along with these changes new teaching and learning pedagogies have been developed. "Student centered learning", "learning by doing", "collaborative learning", "distributed learning", "con-

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structivism'', ''the teacher as a guide on the side and not a sage on the stage'', are but few of the buzzwords associated with the new trends in teaching and learning.

Traditional distance learning universities provided an answer to the accessibility and flexibility issues. In institutions based on distance learning studying is independent of time and place as textbooks replace face-to-face instruction. However, when students need additional support they have to come to local study centers. Moreover, in distance learning institutions students have relatively little direct interactions with other students and with instructors. Thus opportunities for discussion and debate of academic issues are limited.

With the development of communication technologies and the changing of learning and teaching paradigms distance learning has also entered a new era. New Internet learning environments have been developed mainly for asynchronous learning while video conferencing and satellite systems have been used for synchronous activities. All these offer means to overcome some of the shortcomings of the traditional distance-learning environment.

Along with the paradigm shift in teaching and learning, the distinction between distance and on-campus students slowly disappears and students can act as intelligent consumers who determine the appropriate combination of courses delivered electronically and face to face (Turoff, 1997). Naturally, students are not all equally satisfied with the introduction of new learning environments: some welcome them and join courses that use these technologies, while others avoid such courses. In the present study we examined some variables which might affect students' choices. Identifying these variables may help in the design and implementation of learning environments that will better fit the students' need.

The Open University of Israel (OUI) is a distance learning institution in which learning technologies have been integrated during the last 5 years. An Internet-based learning environment has been developed as a learning platform for many courses. Consistent with the ideology of student autonomy, students have been encouraged to choose the learning environment that they prefer: either Internet-assisted or traditional distance learning (IDL vs. TDL). Both environments fit ''traditional'' as well as ''non-traditional'' student populations: those who are full time students as well as those who have additional obligations such as work and family.

The purpose of the present study was to examine differences between students who chose the two learning environments. We examined three types of variables: demographic variables, achievement variables and value priorities.

1.1. Demographic variables

Consistent with past research, we hypothesized gender and age differences in preferences of learning environments. As males express more positive attitudes towards computers, than do females (Martin, 1991; Rosen, Sears, & Weil, 1987), we expected a higher percentage of males in the Internet-assisted distance learning environment (IDL) than in the traditional distance learning environment (TDL).

Age has been shown to be highly correlated with significant levels of computer anxiety (Czaja & Sharit, 1998; Elder, Gardner, & Ruth, 1987; Francis, 1990; Geurin & Kohut, 1988; Harold, 1993; Herkimer, 1985; Hudiburg, 1990; Johnson, 1987; Rosen et al., 1987); younger people show less anxiety than older people. Thus, we hypothesized that older students will tend to avoid studying in an Internet-assisted distance-learning environment.

1.2. Achievement variables

We examined three variables indicating past academic achievement in various areas: Grade in an "Introduction to Statistics" course, English proficiency grade and the general grade-point-average.

Past research indicates that computer anxiety is related to Math anxiety and to the area of studies chosen by students: social science and humanities students had much higher computer anxiety and much less positive attitudes towards computers than did science and business students (Rosen et al., 1987). Thus, computers are probably perceived as demanding more analytical thinking abilities. Assuming that Math anxiety is negatively correlated with success in Math (Frary & Ling, 1983), we predicted that past performance in a Statistics course would be positively correlated with preference of the learning environment: those who would chose the Internet-based environment would also have a higher score in Statistics than those who would chose the traditional learning environment.

Although the Internet-assisted learning environment used by the Open University is in Hebrew, the general Internet environment and the WWW are mainly conducted in English. Students in all Israeli universities are expected to show English proficiency because most of the advanced learning material is in English. First year students take an English proficiency exam, according to which it is decided whether each student's level is high enough to get an exemption from English studies, or whether he or she has to study English language courses. As computer activities are often perceived to be related to English proficiency (Yaghi & Abu-Saba, 1998), we predicted that level of English would be related to the choice of the learning environment.

As the Internet-assisted environment in its present form is an extension of the traditional learning environment (and not a replacement of any pedagogical or didactic element), we assumed that those students who were more motivated and were willing to invest more in their studies would be more willing to choose the Internet-assisted learning environment. Average success in previous courses might be an indication of motivation and investment in studying (though it also reflects, of course, personal ability) and as such can be a predictor of the learning environment chosen.

1.3. Values

From the standpoint of students, learning in an Internet-assisted learning environment requires coping with extensive changes. Students are required to use technologies with which they are not always familiar and to adapt to new modes of interaction with the instructor (interaction through electronic mail or discussion groups). We propose that personal value priorities may affect the extent to which students are ready to cope with the introduction of innovative learning methods.

To conceptualize and measure values we used the Schwartz theory of universals in the content structure of value system (Schwartz, 1992). According to this theory, values are socially approved verbal representations of basic motivations. They are desirable goals that transcend specific situations and serve as guiding principles in people's lives (Schwartz & Bilsky, 1987, 1990; Schwartz & Sagiv, 1995). The crucial aspect that distinguishes between values is the type of motivational goal they express. Schwartz identified 10 motivationally distinct types of values, and validated them in cross-cultural research in many countries (Schwartz, 1992; Schwartz & Sagiv, 1995).

Actions taken in pursuit of each type of value have psychological, practical, and social consequences that may conflict or may be compatible with the pursuit of other value types. The total pattern of relations of value conflict and compatibility among value priorities yields the distinction among two bipolar value dimensions according to the motivational goals they express: (1) a conflict between Openness to Change (Self-direction and Stimulation) and Conservatism (Conformity, Tradition and Security); and (2) a conflict between Self-transcendence (Universalism and Benevolence) and Self-enhancement (Achievement and Power). We postulate that the first conflict is most relevant to the choice of innovative versus traditional learning environments.

Conservatism values emphasize preservation of the status-quo. They emphasize submission and commitment to prevailing beliefs, practices and institutions (tradition), restraint of actions or inclinations that might violate social expectations or norms (conformity) and a preference for a stable, secure environment (security). Studying in an innovative learning environment introduces change, uniqueness and instability to the student's life, and hence may threaten attainment of these goals.

Openness to change values emphasize following one's own intellectual and emotional interests even in unpredicted and uncertain directions. They emphasize autonomy of thought and action (self-direction) and the pursuit of affective arousal through novelty, change and excitement (stimulation). Participating in the Internet-supported courses allows students to attain those goals of independence and innovation.

We therefore hypothesized that individuals who chose to participate in the Internet-assisted courses, attribute higher importance to openness to change values and lower importance to conservatism values than those who chose not to participate in those courses. Thus, we predicted that the difference between openness to change values and conservatism values will be higher in the IDL group than in the TDL group.

2. Method

Since the beginning of 1998 the OUI has offered students the choice in a number of courses between a Traditional Distance Learning environment (TDL) and an Internet-assisted Distance Learning environment (IDL). For the sake of the present study the student population of Introductory and Regular (first year and second year) courses, with at least 10 students in the IDL group, was studied. Thus, five courses were chosen: Introduction to Life Sciences (LS), Mass Communication (MC), Technology, Culture and Social Change (TCS), Psychopathology (PSY) and Physiology of Behavior (PB). Table 1 describes the study sample.

Data regarding demographic and academic achievement variables was taken from the main student information database. A sub-sample of students (mainly those who were registered for the courses in the second semester of the 1999 academic year) completed a shortened version of the Schwartz Value Survey (SVS). This version consisted of the 44 values that were found to have consistent meaning across cultures. For each item, respondents were asked "how important is this value as a guiding principle in your life?" Scale ranged from −1 ("opposing my principles"), 0 ("not important") to 7 ("of supreme importance"). The standard indexes recommended in Schwartz (1992, 1994) were used to measure the priority given to the value types.

3. Results

3.1. Demographic variables

3.1.1. Gender differences

Table 2 presents the percentage of males who chose each learning environment in each one of the studied courses and across all courses. As expected, the percentage of males in the IDL environment was significantly higher than in the TDL environment, across the sample. Looking at each course separately, this was true for three out of five courses.

3.1.2. Age differences

The TDL and the IDL groups did not differ in the average age of their students. However, when comparing the age distribution in the two groups (see Table 3), we found interesting differences.

The IDL group of students had a higher percentage of very young students (high school teenagers and soldiers) and of older students (31–40) compared with the TDL group. In contrast, the TDL group had a higher percentage of students in the 21–30 age range.

Table 1
Number of students who chose TDL and IDL in five courses

Learning environment	Courses					
	LS	MC	TCS	PSY	PB	Total
TDL	270	693	99	310	394	1766
IDL	174	48	10	78	42	352
Total	444	741	109	388	436	2118

TDL, traditional distance learning environment; IDL, Internet-assisted distance learning environment; LS, Life Sciences; MC, Mass Communication; TCS, Technology, Culture and Social Change; PSY, Psychopathology; PB, Physiology of Behaviour.

Table 2
Percentage of males in each learning environment by courses and overall

Learning environment	Courses					
	LS	MC	TCS	PSY	PB	Overall
TDL	48.9	26.7	28.3	14.8	22.3	27.1
IDL	44.8	20.8	40.0	28.2	33.3	36.4
(IDL−TDL)	−4.1	−5.9	11.7	13.2**	11.0*	9.3***

* $P<0.10$.
** $P<0.01$.
*** $P<0.001$.

3.2. Achievement variables

3.2.1. Introduction to Statistics

In only two of the five courses we examined most of the students had taken the Statistics course. We therefore did the analysis only on those two courses. Out of 704 students in the TDL group in Psychopathology and Physiology of Behavior courses, 613 had a grade in statistics (87%). Out of 120 in the IDL in the same courses 98 (81.6%) had a grade in statistics. The average grade in the IDL group (79.52) was significantly higher [$t(822) = 2.87$, $P < 0.01$] than the average grade in the TDL group (76.03). Thus, students who choose to join the IDL group are better in Statistics.

3.2.2. English proficiency

Table 4 shows the percentage of students with an exemption from English studies in the IDL and TDL groups, for each one of the five courses, and overall. In all courses, the IDL group had a higher percentage of students with English proficiency than the TDL group.

3.2.3. Grade point average and final grade in present course

The average grade in all OUI previous courses (previous to the present one) is presented in Table 5. In four of the five courses the average grade in the IDL group is higher than in the TDL group and in two of them, and overall, this difference is significant. The same average difference, of about 3 points, can be seen also in the final grade of the present course in Table 6.

Table 3
Age distribution in TDL and IDL groups (in percentages)

Learning environment	Age					
	⩽20	21–30	31–40	41–50	51–60	60+
TDL	4.0	74.6	14.4	5.5	1.4	0.2
IDL	10.8	59.8	21.1	5.7	2.6	0.0
(IDL−TDL)	6.8***	−14.8***	6.7***	0.2	1.2	−0.2

*** $P < 0.001$.

Table 4
Percentage of students with an exemption from English studies in each learning environment, by courses and overall

Learning environment	Courses					
	LS	MC	TCS	PSY	PB	Overall
TDL	4.4	6.2	8.1	18.1	17.5	10.6
IDL	8.0	8.3	10.0	35.9	26.2	16.5
(IDL−TDL)	3.6*	2.1	1.9	17.8***	8.7*	5.9**

* $P < 0.10$.
** $P < 0.01$.
*** $P < 0.001$.

We examined the possibility that the differences in achievement are due to the higher percentage of males in the IDL environment than in the TDL environment because males have higher grades. To test this possibility we examined the interaction between gender and grades (Figs. 1 and 2). The figures clearly demonstrate that the differences between the IDL and the TDL groups in the average grade in previous courses and in the grade in the present course, still exists when holding gender constant.

Table 5
Average grade in previous courses in each learning environment, by courses and overall

Learning environment	Courses					
	LS	MC	TCS	P	PB	Overall
TDL	77.5	75.2	74.9	80.4	79.3	77.4
IDL	80.1	76.3	73.0	82.9	80.0	80.0
(IDL−TDL)	2.6*	1.1	−1.9	2.5***	0.7	2.6**

* $P<0.10$.
** $P<0.01$.
*** $P<0.001$.

Table 6
Average grade in the present course in each learning environment, by courses and overall

Learning environment	Courses					
	LS	MC	TCS	PSY	PB	Overall
TDL	73.5	73.9	70.0	84.3	77.6	76.7
IDL	76.3	77.4	70.4	87.2	77.8	79.6
(IDL−TDL)	2.8*	3.5	0.4	2.9**	0.2	2.9**

* $P<0.10$.
** $P<0.01$.

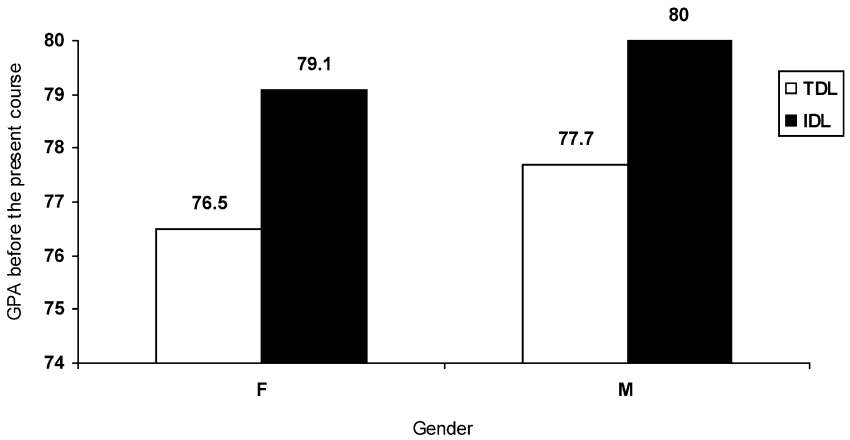

Fig. 1. Mean GPA for males and females in TDL and IDL groups.

We also examined whether the differences in achievement are due to the differences in age distribution between the IDL environment and the TDL environment because "non traditional" students (very young and over 30) have higher grades than traditional ones (in the age range of 20–30). To test this possibility we examined the interaction between age and grades in previous courses. IDL students had a better GPA in previous courses in all age groups, and these differences were significant for the 20–30, 30–40, and 50–60 groups ($P<0.001$, $P<0.05$, $P<0.01$, respectively). Very impressive is the difference in the 50–60 age group: the 24 students in the TDL environment had a GPA of 75 while the nine sudents in the IDL environment had a GPA of 83. These results clearly demonstrate that the differences between the IDL and the TDL environments in the average grade in previous courses still exists when holding age constant.

3.3. Values

To test the hypothesis that individuals who chose to participate in the Internet-assisted courses, attribute higher importance to openness to change values and lower importance to conservatism values than those who chose not to participate in those courses we computed for each participant a value score, based on the difference between the importance attributed to openness to change values and to conservatism values. As hypothesized, participants in the IDL group received higher scores on this value dimension than those in the TDL group [$t(524)=2.25$, $P<0.05$]. A closer look at the means for the various value types, reveals however that the main difference was in self direction and in tradition values. Average scores on the five values types are presented in Table 7. As hypothesized, students who chose the IDL environment differed in their value priorities from students who chose the TDL environment. Consistent with hypotheses students who

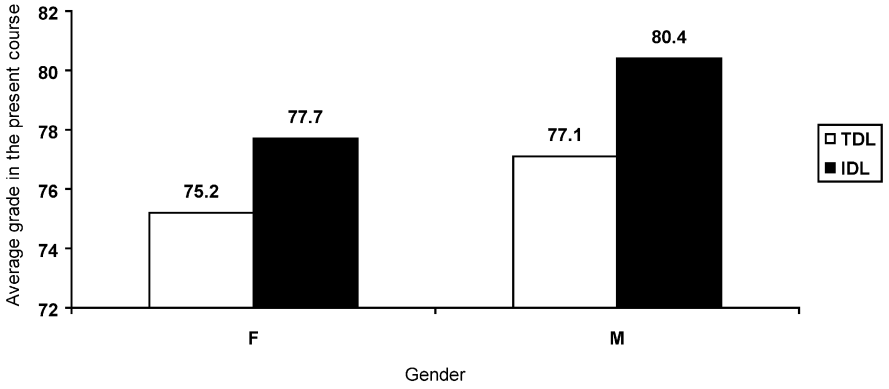

Fig. 2. Mean grade in present course for males and females in TDL and IDL groups.

Table 7
Average scores on the five values types in each learning environment

Learning environment	Tradition	Conformity	Self-direction	Stimulation	Security
TDL	3.78	4.77	5.31	4.49	5.16
IDL	3.49	4.63	5.55	4.44	5.28

opted for the IDL environment attributed higher importance to self direction values [$t(514) = 2.31$, $P < 0.05$], and lower importance to tradition values [$t(514) = 2.07$, $P < 0.05$]. No other differences were significant.

The Value Survey was administered anonymously and students' responses couldn't be matched with any of the variables that we took from the student information database. Thus, we did not examine whether differences in values were due to differences in age or gender.

4. Discussion

Students who choose the Internet-assisted Distance Learning environment differ from those who choose the Traditional Distance Learning environment in most of the predicted demographic, achievement and value variables.

Consistent with past research, the IDL group had a higher percentage of males, probably because of the more positive attitudes male have towards computers (Martin, 1991; Rosen et al., 1987). In contrast to past research the IDL group was not younger thank the TDL group. Its age distribution, however was different from the one in the TDL group: the IDL group had a higher proportion of very young students (up to 20) and of relatively old students (above 30), and a smaller proportion of students in the age range of 20–30.

The result regarding the very young students (up to 20 years old) is not surprising and is consistent with past research: they were born to a technological society and have more experience with computers than older populations. Moreover, in Israel, this group of students consists of very exceptional high school students for whom high school studies are not enough, and of soldiers in their 3 years of compulsory army service who are very motivated to continue studying while in service. Thus, In addition to having, probably, more computer experience they are highly motivated to learn.

Students in the age range of 20–30 are usually called ''traditional'' students while older students are named ''non-traditional'' students (Hemby, 1998). The ''non-traditional student'' concept is often a synonym to the ''adult learner'' concept though age is not the only variable determining a non-traditional learner. Being primarily financially self-supporting, acting as a primary caregiver for a relative(s) and being married and living with spouse, or being divorced or widowed and not living with parents or receiving primary financial support from others, are also variables mentioned in the literature as defining ''non-traditional learners'' (Cross, 1981; Waltman, 1992). In a recent study on non-traditional and traditional students Hembly (1998) found that non-traditional students do not necessarily show more computer anxiety. He claimed that computer anxiety in non-traditional students depends on their self-directedness in learning. As they are more self-directed and are more concerned about meeting standards set for themselves, by themselves, rather than by others, they are less anxious in environments nurturing this learning style.

Could the results of our study be due to differences in life circumstance between traditional and non-traditional students? Do non-traditional students prefer the IDL learning environment because it fits better with their lifestyle? We did not examine this possibility directly, but we think it unlikely. One of the aims of the Open University is to create learning environments that fit the lifestyle of people who must juggle between multiple commitments. Both the TDL and the IDL groups were offered some face-to-face tutorials (after conventional working hours), but were not

obligated to participate in them. Both groups received all of the course materials at home, could submit their papers by mail and communicate with their instructors by phone. Thus, both environments fit ''traditional'' as well as ''non-traditional'' student populations.

The results concerning the achievement variables support the conclusion that those who choose the IDL environment are, on average, better students than those who choose the TDL environment. They have higher grades in Statistics and in the present course, a higher grade point average in previous courses, and a higher proportion of them have shown English proficiency. Success in Statistics may be related to less Math anxiety and this is known to be related to lower computer anxiety and a higher willingness to join an IDL environment. English proficiency helps in surfing the Internet and thus may also be a facilitator in the decision to join an IDL environment. Success in Statistics, in English, in previous courses and the present one might be a result of academic capabilities and/or of high motivation. Motivation probably plays a role in choosing the IDL environment as most of the activities related to it are voluntary.

The hypotheses concerning differences in value priorities received partial support. As hypothesized, students who opted for the IDL environment attributed higher importance to self-direction values. These values emphasize independence in thought and action, as well as creativity and curiosity in exploring the world. Also as hypothesized students who opted for the IDL environment attributed lower importance to tradition values, and to a lesser degree to conformity values (the latter difference was not statistically significant). These values emphasize maintenance of the status quo, and thus reflect preference of what is familiar and well organized. Contrary to hypotheses the two groups did not differ in the importance attributed to stimulation values. These values emphasize novelty, variety, change and excitement.

These findings may lead to a better understanding of how Internet support is perceived by prospective students. It seems that students perceive this new learning environment as providing opportunities for exercising independence, creativity and satisfying curiosity, and thus it is attractive to students who value self-direction. On the other hand, Internet support may also be perceived as involving ambiguous and unsystematic activities and hence it is not attractive to individuals who attribute high importance to conservatism values.

Could the value differences found in the present study be due to differences in age between the TDL and the IDL groups? Values represent basic motivation goals. As such they are relatively stable. Yet, values are likely to change following significant experiences. Thus, younger people usually attribute higher importance than adults to stimulation, achievement, power and hedonism values, and attribute less importance to security, conformity, and tradition values (e.g. Sagiv & Roccas, 1998). In the present study we did not examine directly the combined effects of age and values on choice of learning environment because (as already mentioned) we could not match between the value priorities of participants and their demographic characteristic. This is an open issue for future research.

The present results have methodological and practical implications for future research and practice. Hundreds of media comparison studies have been conducted mainly comparing conventional face-to-face learning environment with different technology assisted environments. The purpose of these studies has been mainly to prove the effectiveness of the innovative media. However, that goal was not achieved. The frequent research result has been ''no significant difference was found'' (for a review see Russell, 1999). Recently, the above line of research was under a heavy attack regarding its purpose and methodologies. The research goals were criticized

on the ground that technology is only a delivery medium and that pedagogy and the instructional methods are the key factors in the learning effectiveness (Clark, 1994). From a methodological point of view media comparison studies have been heavily criticized on multiple grounds (e.g. Institute for Higher Education, 1999): In many of the studies a control group was either absent, unspecified or non-random. Moreover, key variables were not controlled for: the instructional methods, the prior knowledge of students, the instructor, different students' characteristics, to mention but a few. Thus, many alternative explanations could be offered for any result.

The present study shows that when comparing the effectiveness of two different learning environments, researchers cannot assume that the groups of students studying in them are similar in variables relevant to learning effectiveness. On the contrary, students choose the learning environment which suits them best, resulting in two learning groups which differ in many dimensions. The results of the present study indicate that as long as participating in IDL is optional, its success cannot be judged by comparing performance measures of students in IDL and in TDL environments. The two groups of students are not two random samples. They are different groups of students and the differences are related to success measures. One example will suffice: students in the IDL group had a higher GPA in their previous courses than students in the TDL group, and the same difference was seen in their final grades in the present course. This last difference cannot and should not be attributed to the special learning environment they had.

From a practical point of view, the present results strengthen the need to change the approach taken when planning instruction. An instructional designer should not ask himself "which learning environment is best", but "which learning environment is suitable for whom", or "who will benefit more from each one of different possible components or delivery medium in the learning environment". This shift in emphasis is very typical in the development of many disciplines. Looking for main effects is very often a 'childhood disease'; while interactions are more typical of findings when a discipline matures.

In the present study demographic variables, achievement variables and values were examined. However, there are many other variables that could affect the preference for a certain learning environment which should be studied in the future: some are personality variables (e.g. internal/external locus of control) others are cognitive ones (e.g. cognitive/learning styles).

We predict that some of the differences found in the present study will vanish in the future. When computers and the Internet will be part of the learning environment in school and at home, working with computers will no longer be perceived as related to mathematics, masculine, and as innovative, but as one of the tools in a rich friendly tool-kit for distance learners.

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