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Effects of motivational and volitional email messages (MVEM) with personal messages on undergraduate students' motivation, study habits and achievement

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Abstract

This study investigated what kind of supportive information can be effective in improving the situation where there were severe motivational challenges. Motivational and volitional email messages (MVEM) were constructed based on an integrated model of four theories and methods, which are Keller's ARCS model, Kuhl's action control theory, Gollwitzer's Rubicon model of motivation and volition, and Visser & Keller's strategy of motivational messages, and distributed with personal messages created based on audience analysis to a large undergraduate class. In order to examine the effects of the messages on motivation for the course, study habits (study time), and achievement (test grade), MVEM were sent to 30 students (Personal Message Group: PMG) with personal messages and to 71 students (Non-Personal Message Group: NonPMG) without personal messages. Results indicated that PMG showed a higher level of motivation, especially in regard to confidence, than NonPMG. Also, the mean test grade of PMG increased so that the initial difference of the test grade between the two groups significantly decreased. Although there was no difference between the two groups in study habits, the findings suggest that personal messages addressing specific individual problems raise the positive effects of MVEM constructed based on the integrated model. Future research directions are discussed.

Introduction

One of the challenges in motivating students in large undergraduate lecture classes arises from the difficulty in establishing personal contact with them and making them feel that their individual needs, interests and goals are being addressed by the instructor. Some researchers have acknowledged the lack of personal attention given to students in large lecture classes (Benedict & Hoag, 2004) and efforts have been made to use specific interventions to solve the problem. For instance, some studies attempted to increase students' motivation by using educational software (Huang, Huang, Diefes-Dux & Imbrie, 2006) to heighten students' engagement in class by means of discussion sections in which an 'active learning component' was added (Buckley, Bain, Luginbuhl & Dyer, 2004, p. 231). However, many of these studies seemed to merely describe the intervention rather than analyse its conceptual basis and effectiveness in solving the problem.

This difficulty becomes even more problematic when the courses are required regardless of students' interests. Even though the students may be extrinsically motivated by grades, and thereby want to succeed in exams and assignments, they may still experience obstacles in their studies because of not being intrinsically motivated, which makes them more vulnerable to the distractions that occur in university life. Thus, there can be motivational problems with regard to their desire to succeed, and volitional, or self-regulatory, problems with regard to their skills in staying on task; and this is a limitation in the previously mentioned studies because they do not address both the individual motivational and volitional problems of the learners. In the present study, we designed an intervention that included motivational and volitional strategies that were sent via email to individual students based on their diagnosed problems, thus providing the element of personal attention. These email messages contained study tips designed to improve students' motivation and study habits, and thereby result in higher achievement.

Emails have potential for improving interactions between instructors and students by providing a means of sending supportive information with personal attention directly to each student. A benefit of using emails is that they enable one to overcome time and space constraints that instructors might have (Alexander, Zhao & Underwood, 2002; Cifuentes & Shih, 2001). Email also has the advantage of asynchronism; it permits a time-lag between senders and receivers that may stimulate students' reflection (van der Meij & Boersma, 2002).

In fact, many studies on the effects of emails have been conducted in a variety of contexts. For example, email has been used for interactions between instructors and students, or among students to facilitate mentoring (Boxie, 2004; Burgstahler & Cronheim, 2001; Cascio & Gasker, 2001), collaborative work (Dunlap, Neale & Carroll, 2000; van der Meij & Boersma, 2002) and class activities (Davenport, 2006; Nicosia, 2005; Poole, 2000). However, most of the emails in these studies did not seem to consider students' interests, emotions, motivations, etc; rather, they focused on course-related information. This might be because the studies were conducted in classes with a

small number of students, where it might have been possible for instructors to already pay personal attention to the students. Therefore, the results of these studies regarding the effectiveness of emails might not generalise to large lecture classes. Also, because there was no preliminary analysis of students' interest, emotions, motivation, etc, there was no information about whether or not students might have already been motivated before email was used. Their situations might have been different from those from the conditions in large, required courses where students might not have much intrinsic interest. Accordingly, it is necessary to determine what type of email will best support the personal needs of students in large lecture courses.

It is also important to acknowledge that one of the limitations of using emails as a way of providing student support is that it could be prohibitively time consuming for an instructor. Therefore, part of the purpose of the present study was to develop, implement and validate a prototype of a process that, with further development, could perhaps become more proceduralised and efficient for instructors to implement. This was accomplished in a different setting that involved teachers working in groups to plan and incorporate motivational strategies with junior high school students in a demonstration project on computer applications in the classroom (Suzuki & Keller, 1996). A systematic motivational design process that had been validated in numerous settings (Keller, 1999; Naime-Diefenbach, 1991; Small & Gluck, 1994) was too time consuming and complex for teachers to incorporate into their normal planning and teaching process. Thus, a simplified process was developed based on the original process, and it proved to be satisfactory. However, that process would not generalise to the present situation for at least three reasons: (1) the conditions in large-lecture college classes are more challenging, (2) the present study used an email process, and (3) the current study incorporated volitional strategy design together with motivational strategies.

Along these lines, this study constructed motivational and volitional email messages (MVEM). These concepts were used because such courses tend to have threats to motivation (eg, the lack of instructors' personal attention to students, required courses regardless of students' interest, etc) and volition (eg, difficulty avoiding distractions and taking actions on academic goals.), and thereby, the application strategies related to the two concepts were expected to provide solutions for such threats. The construction of MVEM was based on four theories and methods. The first, Keller's motivation model (Keller, 1983, 1987b, c), combines a theory of motivation with a systematic design process to diagnose and prescribe solutions to motivational problems. The theory is based on a synthesis of motivational concepts and theories that, based on an analysis of their shared attributes, can be subsumed in four categories that give rise to the ARCS acronym called attention, relevance, confidence, and satisfaction. The second is Kuhl's (1987) action control theory that elucidates factors affecting a person's efforts toward achieving his goals as well as strategies helping him persistently make efforts to accomplish them. Third, the Rubicon model of motivation and volition (Gollwitzer, 1999) explains how a person progresses from motivational desires to sustained volitional behaviour by formulating and implementing the appropriate kinds of intentions and commitments. These three theories and processes have been integrated by Keller

(2004a) into a 'macro model' that illustrates how each component contributes to explanations of sustained learner effort in pursuit of a goal, and also illustrates how the components interact with each other and with other influences on learning and performance.

The fourth component of the conceptual foundation and method for this study is an approach developed and validated by Visser and Keller (1990) for the development of 'motivational messages'. Keller's motivational design process, which incorporates a systematic approach for analysing learners' motivational requirements and then designing strategies that pertain specifically to the identified needs, was used as a basis for creating the messages. This was a setting in which there were severe motivational challenges that resulted from the working conditions and political situation in the developing country in which this innovation was created and tested. That class was small in size and conducted on-site where the participants were employed. Even though it was a formal and rigorous academic course, the atmosphere was somewhat like that of a workshop, and the instructor (the first author) had a close working relationship with the participants. The content of the messages pertained to the four motivational categories defined within the ARCS model, and three types of messages were included. The first type was pre-planned based on *a priori* analyses of anticipated motivational problems, the second was sent to the whole class based on events that occurred unexpectedly, and the third consisted of messages that were designed for and distributed to specific individuals based on individual problems that were identified (Visser & Keller, 1990). The messages were prepared on paper, like greeting cards, and distributed in between class meetings by leaving them without comment at the students' work stations or handing them off in person. This was because the experimenter wanted the messages to appear to be a normal part of the course, and he did not want to call special attention to them.

Because it was a case study-type of research, Visser and Keller (1990) used a variety of measures such as weekly questionnaires, open-ended 65-minute round-table discussions, class observations, grades on assignments and course, etc, together with data from previous sections of the class regarding attrition, attitudes and achievement. Both the quantitative and qualitative data that were gathered during and after each week of instruction showed that students' attitudes towards the course and activities positively improved, as well as their persistence in completing the course requirements. As a result, the retention rate was higher than normal and the quality of their performance, based on objective measures of achievement, improved compared to previous offerings of the class.

The setting of the present study was different from Visser and Keller's (1990) in several ways. First, although the instructor had a general knowledge of the motivational challenges faced by the students, she did not have a close working relationship with the students or personal knowledge of events in their lives that might adversely affect their studies. Also, she was not able to personally distribute messages. In addition, the messages distributed via email were somewhat impersonal compared to the previous study;

however, considering the widespread use of this medium, students might view such messages as a type of personal attention (Woods, 2002). And, the theoretical foundation of the previous study was much narrower than the present one, which added concepts and strategies pertaining to learner volition. In sum, the purpose of this study was to investigate whether MVEM constructed based on the four theories and methods, with personal messages created based on audience analysis, could be used to promote students' motivation, study habits (study time), and achievement (grade). Specifically, the study compared the motivation, study habits, and achievement of students receiving two types of email messages: MVEM with personal messages and MVEM without personal messages.

In this study, it was hypothesised that the type of email messages would affect students' motivation, study habits and achievement. Specifically, it was hypothesised that the motivation level would be higher on account of motivational strategies, study habits would be better on account of volitional strategies, and thereby achievement would be higher as a result of increased motivation and volition among those receiving MVEM with personal messages than among those receiving MVEM without personal messages.

Method

Participants

The participants in the study consisted of 101 undergraduate students enrolled in an archaeology course at a south-eastern public university. The mean age of the participants was 20 years. Of the sample, 63.4% were men and 36.6% were women. The purpose of the course was to help students understand human cultural and social evolution and general archaeological knowledge. The majority of participants were freshmen and sophomores, and the course fulfilled a requirement for all of them. Some of the participants were interested in majoring in this area and the others were taking it as a general education requirement. They voluntarily participated in this study and did not receive extra credit for their participation. However, the submission of logbooks with answers to questions about time spent studying and other things was a required activity for all, and they received credit for class participation. The volunteer participants received additional information and survey questions in accordance with the study's treatments. The participants were randomly assigned to one of two groups: one received MVEM with personal messages (Personal Message Group: PMG) and the other received MVEM without personal messages (Non-Personal Message Group: NonPMG).

Independent variables

The independent variable was the type of email messages sent to the participants. The first level of the independent variable was MVEM with personal messages that were constructed based on individual audience analyses. The other level of the independent variable was MVEM without personal messages, containing only general motivational and volitional strategies. These general messages are much quicker to design and implement because they do not require as much diagnostic time as personal messages, and they can also be distributed more quickly.

Specifically, there were three potential components to given MVEM. The first pertained to motivation-enhanced messages for the four categories of the ARCS model (ie, attention, relevance, confidence and satisfaction) (Keller, 1987a, b, c). The attention-enhanced message incorporated a tactic to stimulate a sense of inquiry in students. The relevance-enhanced message used a tactic to relate the course objectives to their general academic goals in familiar ways. The confidence-enhanced message utilised a tactic to convince them that they would achieve their goals once they read the strategies given and had used them. The satisfaction-enhanced message implemented a tactic to show what they would get after accepting the given strategies and using them. Following is an example of one of the confidence-building messages: 'Last year, a group of students received these strategies and used them. The grades went up for eighty-two percent of the students' who used the strategies, and their average improvement was two/thirds of a grade (for example, from a C to a B–). Some went up more, some less, but the evidence tells us that these strategies can be very helpful'. The purpose of this message was to build their expectations that effort can lead to higher performance.

The second potential component of the MVEM consisted of the volitional messages incorporating Gollwitzer's (1999) concept of implementation intentions. As volition was defined as transforming desire to action (Keller, 2004b), this part highlighted the strategies that could help students take action on their goals. That is, this part explained the need to plan achieving a goal and to make a commitment to the goal after having set a goal. These components corresponded with the subconcepts of implementation intentions (ie, commitment to goal, formation of intention commitment, intentions for action, etc). Sometimes people do not appreciate the positive effect of having strong intentions. In fact, they are suspicious of 'intentions' because of negative connotations of the word. Therefore, the following message was designed to help students appreciate the importance of intentions by acknowledging the negative aspects and then promoting the positive aspects: For example, one of the messages said, 'Sometimes people discount the importance of intentions. They say things like, 'the pathway to Hades is paved with good intentions'. In spite of this, having the appropriate kinds of intentions is critical to success. Notice I said "appropriate" intentions. You develop appropriate and productive intentions in regard to planning your study times and developing resistances against obstacles that will pull you away from your plans'. This message was followed by guidance on building appropriate intentions.

Lastly, the third potential component of MVEM included another set of volitional messages implementing Kuhl's (1987) six action control strategies: (1) selective attention intended to encourage students to pay attention only to the information related to actions for their goals; (2) encoding control intended to facilitate accepting their current task as a requirement to achieve their goals; (3) emotion control intended to prevent any negative feelings from interfering with actions for their goals; (4) motivation control as covered in the above-mentioned motivational messages; (5) environment control intended to protect them from distractions or social commitments by advising them to let people know their goals and plans; and (6) parsimonious information processing intended to help them make decisions on how to effectively and efficiently distribute time

and effort for their actions. Following is a message designed to help the student avoid negative emotions (emotion control) and keep attention on the task (selective attention): 'Keep reminding yourself that this is a job, not recreation. Try to keep neutral attitudes if you can't, in fact, find anything interesting about the material'.

Personal messages sent with MVEM to the PMG were constructed based on Visser and Keller's (1990) systematic design process, which utilised individual audience analysis (Figure 1). Personal messages were operationally defined as containing a personalised salutation (the student's name) and a personal message based on the student's questionnaire responses pertaining to the various motivational and volitional elements. For example, if a student indicated boredom regarding the course material, the personal message sent to this student contained a tactic to stimulate a sense of inquiry. If a student felt that his study time was not effective, then the personal message contained volitional strategies to help the student apply more effective study habits.

Dependent measures

Participants' motivation for the course was measured using pre- and postsurveys of an abbreviated version of Keller's Course Interest Survey (CIS). The original CIS instrument (Keller & Subhiyah, 1993) was developed in correspondence with a theoretical foundation represented by the ARCS Model (Keller, 1987a, 1987b, 1987c) and designed to measure students' reactions to classroom instruction. In the present study, three items asking about their overall attitude in each of the three categories of attention, relevance and confidence, were used. This was because there were many other questions asking their study time of each day of the week in the surveys, and researchers tried to limit the number of questions about motivation. The satisfaction dimension was not measured because it was not expected to be influenced during the time this study was implemented. Responses to the items were in the form of a 5-point Likert scale. Based on Cronbach's alpha measure, the reliability estimate for these three scales was >0.70.

Participants' study habits were measured using pre- and postsurveys asking how many total hours were spent studying during the week of the test. Participants' achievement was measured by their grades on each of two regularly scheduled tests that were administered during the study. The interval between the two was 1 month. The former was given before MVEM were distributed, and the latter was given after they were distributed. The instructor of the course conducted the grading processes using a 12-point scale (F = 1, A = 12) consisting of the normal five grade levels and including plus and minus distinctions for all grades except that there was no F+ or A+.

Procedure

During the week that participants received their grades on the test that preceded the beginning of this study, which was the second test of the semester, they responded to a presurvey on motivation for the course, satisfaction with their grades on the test and study habits. The survey took approximately 5 minutes, and was administered via email.

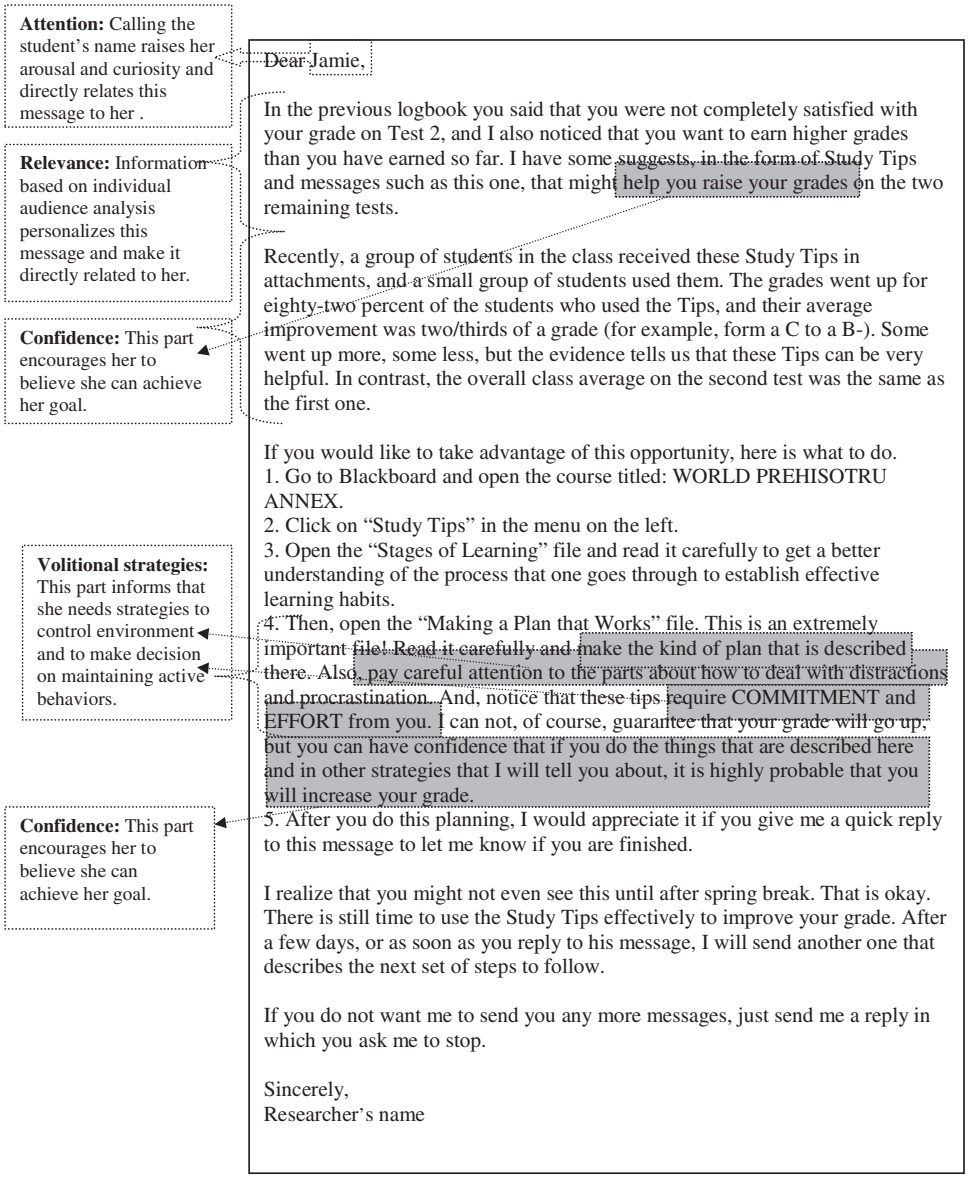

Figure 1: Example of motivational and volitional email messages with personal message (The student's name is a pseudonym.)

Participants' were assigned to one of two groups based on their reported grade satisfaction level. Those who indicated a low level of satisfaction (extremely unsatisfied, moderately unsatisfied, or moderately satisfied) were assigned to the PMG that received MVEM with personal messages. The participants who indicated a high level of satisfac-

tion with their grades (very satisfied or extremely satisfied) were assigned to the NonPMG that received MVEM without personal messages.

The responses of participants in PMG were individually analysed and personal messages were constructed based on the analyses. MVEM with personal messages were sent to the PMG ($n = 30$) and MVEM without personal messages were sent to the NonPMG ($n = 71$) during the weeks before the second test of the study.

During the week when participants received the grade on the test, each group responded to a postsurvey on motivation for the course and study habits. The postsurvey took approximately 5 minutes, and was administered via email.

Data analysis

The data were analysed according to the three dependent variables: motivation for the course, study habits and achievement. Presurvey scores and test grades were used to determine whether there were initial differences in any dependent variables between the two groups. Postsurvey scores and test grades obtained after the messages were sent were used to investigate if there were differences between the two groups for each dependent variable. Specifically, in order to determine if there were significant differences between PMG and NonPMG in motivation, study habits (study time) and achievement (grade), multivariate analysis of variance (MANOVA), ANOVA and repeated measure ANOVA (split plot design) were employed respectively.

Results

The means and *SD* for all dependent variables are presented in Table 1. This table is organised according to the types of messages emailed to participants (ie, MVEM with

Table 1: Means and standard deviations for the dependent variables

	MVEM with personal messages (PMG: n = *30)*		*MVEM without personal messages (NonPMG:* n = *71)*	
	*Before message means (*SD*)*	*After message means (*SD*)*	*Before message means (*SD*)*	*After message means (*SD*)*
Motivation				
Interest[a]	2.80 (0.89)	3.01 (0.72)	3.10 (0.76)	2.79 (0.88)
Relevance[b]	2.27 (0.73)	3.65 (0.94)	2.74 (0.90)	3.28 (0.93)
Confidence[c]	3.44 (0.61)	2.56 (0.71)	3.76 (0.80)	2.03 (0.90)
Study habits (Study time)[d]	4.17 (2.77)	3.61 (1.50)	3.57 (2.51)	3.90 (1.91)
Achievement (Text grade)[e]	7.17 (2.21)	7.89 (2.65)	9.57 (2.22)	8.96 (2.48)

[a]Possible range for Interest score (1–5).
[b]Possible range for Relevance score (1–5).
[c]Possible range for Confidence score (1–5).
[d]1 in Study habits score means one hour.
[e]Possible range for Achievement score (1–12).

personal messages vs. MVEM without personal messages). In the following subsections, results are described for motivation, study habits and achievement.

Motivation

Motivation for the course was analysed with MANOVA with the scores on interest, relevance and confidence as the dependent measures. Results revealed that there was an overall effect of the messages on motivation, Wilk's Lambda = 0.913, $F(1, 99) = 3.089$, $p < 0.05$. Univariate results revealed a main effect of the messages on motivation, where those who received MVEM with personal messages (PMG) reported significantly more confidence ($M = 2.56$, $SD = 0.71$) compared to those who received the messages without personal messages (NonPMG) ($M = 2.03$, $SD = 0.90$), $F[1, 99] = 8.051$, MSE = 5.787, $p < 0.05$, $\eta^2 = 0.075$).

Study habits

Study habits were analysed through ANOVA, with the scores of study time as the dependent measure. Results revealed that there was no significant difference in study habits between PMG ($M = 3.61$, $SD = 1.50$) and NonPMG ($M = 3.90$, $SD = 1.91$), $F(1, 99) = 0.506$, MSE = 1.649, $p > 0.05$.

Achievement

Achievement was analysed through a 2 × 2 repeated measures ANOVA with the grades of two tests: one test before and one test after messages were sent. Results revealed that there was a significant interaction between the two factors of time and intervention methods ($F[1, 99] = 5.355$, $MSE = 18.883$, $p < 0.05$, $\eta^2 = 0.051$). This result indicated that students' test grade depended on time (before messages and after messages) according to whether they were in PMG or NonPMG. In other words, PMG and NonPMG's test scores were significantly different before personal message and after personal message such that the means for NonPMG were always superior to PMG, but the means of the two groups moved closer together after messages were sent (Table 1). The significant interaction occurred because the mean of the NonPMG grades decreased while the mean of the PMG group increased (Figure 2).

Discussion

The primary purpose of this study was to examine how the type of email messages (MVEM with personal messages vs. MVEM without personal messages) affected undergraduate students' motivation for the course, study habits (study time) and achievement (test grade). The results are discussed according to the three hypotheses proposed.

First, the hypothesis that personalised MVEM with personal messages would have a positive effect on students' motivation for the course was supported. Students who received MVEM with their names and personal messages (PMG) showed a higher level of motivation than those who received MVEM without personalisation or personal messages (NonPMG). This result adds additional knowledge to the effects of motivational messages as used by Visser and Keller's (1990). They found overall positive effects but did not distinguish between generalised and personal messages as in the present study.

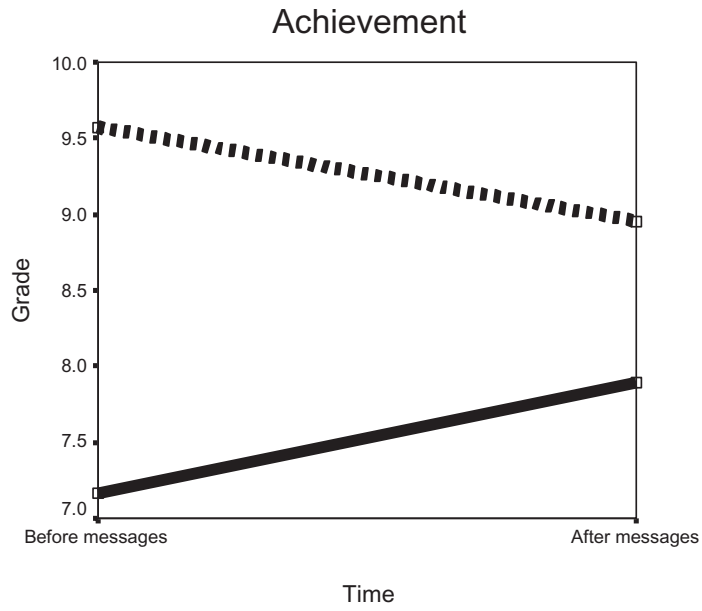

Figure 2: Difference in the grade changes between Personal Message Group (PMG) and Non-Personal Message Group (NonPMG). ▬, PMG; ▪▪▪▪, NonPMG.

In spite of this additional discrimination between types of messages, the PMG messages in the present study were made personalised by putting the student's name in the salutation and by adding a personal message. In a future study it would be good to test these characteristics separately, because it is possible that adding peoples' names to the NonPMG messages would have a beneficial effect without requiring the additional effort to make the content personal. However, we would expect this influence to be minimal and for the personal message to have the major effect.

Another element to consider in the significant results for motivation is that students who were relatively dissatisfied with their first examination were selected for the PMG and the more satisfied ones were in the NonPMG. This is similar to the results in many types of studies where a supportive or scaffolding treatment helps the low performers, but not the high performers. However, in the present study we could not assume in advance that this would be the case. There were two other possibilities that could have affected the results. On the one hand, the confidence levels of everyone decreased after the first test. Thus, it is conceivable that even those students in the nonPMG would have benefited from the messages even though an email sent to everybody tends to be easily ignored (Springgay, 2005).

Another possible influence on the outcomes might be that the students in the PMG would have worked harder anyway because of their dissatisfaction. That is, the dissatisfaction of students in the PMG might have worked as a motive for them to obtain

useful information even without the personal messages. In other words, just as a discrepancy between a person's expectations and actual outcomes becomes a motive for a certain behaviour (Pintrich & Schunk, 2002), their dissatisfaction resulting from a discrepancy between their expectations and actual grades might have become a motive for them to pay attention to MVEM. For a future study, given enough participants, it would be useful to have a completely crossed design to test this possibility. However, given the past experience of the instructor with this course, it was not typical for one subgroup in the class to show a noticeable improvement in students' attitudes. Thus, she felt that the improvement in the PMG was attributable to the messages.

In addition, with respect to motivation, it was found that PMG students indicated a higher level of confidence than NonPMG students, but not in attention or relevance. This may have been because there were more sentences and words in the personal messages that encouraged their confidence than relevance and attention (see, eg, Figure 1). As has been the case in previous studies, manipulating specific components of ARCS resulted in changes in the components that were manipulated (Chang, 2001; Naime-Diefenbach, 1991).

Second, the hypothesis that PMG students' achievement would be better than NonPMG was supported. After the first test the grades of NonPMG were better than those of PMG, which might have been the reason why participants in PMG were dissatisfied with their grades. Although the test grades of NonPMG were still better than PMG after the messages were sent, the grades of PMG group increased so that the initial differences in test grade between the two groups significantly decreased (see Figure 2). This pattern of development of achievement shows an ideal direction that is often hoped to be observed by researchers when conducting interventions that are purposely designed to enhance motivation.

Also, there may have been immediate effects of MVEM not only on their motivation but also on their volition to prepare for the next test. For example, MVEM provided strategies to help them try to keep a neutral attitude towards the course and not to let negative feelings interfere, keep away from environmental distractions, study materials in intervals and so forth. These strategies might have made a greater impact on the participants in PMG who were looking for useful information in order to increase their grades.

Although NonPMG also received MVEM as PMG did, the MVEM without personal messages did not significantly impact the participants' efforts in preparing for the next test. Again, without their initial attention to the emails given, MVEM might not have well been as effective. In other words, the participants in NonPMG might have not successfully transformed from the stage of 'commitment' to the stage of 'formation of implementation intention', and as a result, they might not have been ready to move from 'pre-actional phase' to 'actional phase' (Gollwitzer, 1999).

Lastly, the hypothesis that study habits (study time) would be better among the PMG than the NonPMG students was not supported. It is speculated that the PMG students

may have used their study time more effectively than before and hence it is inferred that their use of volitional strategies was improved. However, although there may have been immediate effects of MVEM on volitional strategies of the PMG students when preparing for the test, and consequently they improved their test scores as a result of more effective and efficient study tactics, this did not necessarily mean that they spent longer periods of time preparing for the test.

Overall, the present study provides preliminary evidence to suggest that using MVEM with personal messages addressing specific individual problems may be useful supports for improving students' motivation and learning in the situation where there are threats to motivation. That students receiving MVEM with personal messages were likely to have a higher level of motivation for the course, as well as improvements in achievement, indicates that implementing MVEM in required, large-lecture classes where there is little interaction between instructors and students, may have a positive effect. In other words, it is concluded that the provision of motivational and volitional strategies with personal messages may be able to promote their motivation and learning in such situations.

However, even though this study provides evidence in support of the use of MVEM, there are several limitations that provide a basis for additional research. The treatment in this study, while longer than in many studies, was only 4 weeks. If messages were sent over the entire semester, the results might have been stronger, especially with regard to study habits. When trying to bring about changes in established attitudes and habits, it would be good to investigate the effects of an even longer treatment with a delayed follow-up measure to determine if positive changes persisted over time.

Also, it would be interesting to investigate the effectiveness of a higher level of interaction with the students. In the present study the treatment was based on students' feedback about their satisfaction levels with the grades they were earning. Although students appeared to have interacted with MVEM with personal messages, there may have been more interactions if students were encouraged to reply to the researchers and give further information about their motivational and volitional problems. It would be interesting to test the effectiveness of having a series of diagnostic questions to the students followed by personal messages.

Also, it would be interesting to obtain a more in-depth understanding of students' attitudes and habits by means of interviews and qualitative analysis. In order to conduct some of these extended studies it would be necessary to have greater access to the participants. In the present study, the researchers had limited time for interacting with the students because of other course activities that placed high demands on their time.

Another conceptual issue that is important to investigate is whether the sender of the email has an effect. It is possible, as in the present study, for a support person to diagnose problems, design messages and send them to the students. However, it is also possible for

the instructor to do this, or for a support person to design the motivational and volitional messages but for them to be sent by the instructor. Messages sent by the instructor might be perceived as more personal and meaningful than messages sent by a researcher or other support person with whom the student is not familiar. But, on the other hand, the students might be more candid with a support person who is helping them than with an instructor because the student might have concerns about his or her image in the eyes of the instructor.

There are also practical issues with regard to having instructors develop and implement MVEM. In addition, future research should also examine how efficiently and effectively MVEM can be used by an instructor alone who is not an expert on motivation and volition. The process requires a certain level of expertise with regard to diagnosing motivational problems and designing messages, and secondly it requires time from the instructor's typically busy schedule to employ this process. The problem of instructor expertise in motivational design could be solved with a tutorial, but planning and implementation time requirements are a bigger problem. Suzuki and Keller (1996) developed a simplified approach to motivational design that enabled teachers to use the process efficiently and effectively. However, in that situation teachers had regularly scheduled group meetings to work on lesson planning, and the motivational design process consisted of analysing problems in the classroom and developing motivational tactics that were integrated into their classroom activities. It did not require continuing individual diagnosis, message design and individualised email transmissions. Future research on this topic could investigate the effectiveness of group messages based on the instructor's knowledge of when there tend to be motivational challenges in the course, and research could also investigate ways of making the process more efficient for the design of personal messages. For instance, a complete database of MVEM that instructors can easily access and can refer to for their students' specific motivational and volitional problems might be a tool for them to utilise motivation and volition expertise.

In conclusion, the findings of this study build on those of Visser and Keller (1990) and others (eg, Suzuki & Keller, 1996) by expanding the concept of motivational design and the clinical use of motivational messages by extending the process to a large undergraduate course and further developing the concept of personal messages. Also, this study incorporated volitional support in the form of study tips, along with the motivational components of the messages. The positive results that were obtained in this study provide additional validational information for the process and provide a basis for continued investigation of this methodology for motivational design.

References

Alexander, M. W., Zhao, J. J. & Underwood, R. A. (2002). An analysis of e-mail technologies used by business educators at the secondary and postsecondary levels. *The Delta Pi Epilon Journal*, *44*, 2, 110–124.

Benedict, M. E. & Hoag, J. (2004). Seating location in large lectures: are seating preferences or location related to course performance? *Research in Economic Education*, *35*, 3, 215–231.

Boxie, P. (2004). Making a cyber literacy connection from the storage room to the college room. *Read Horizons*, *45*, 2, 127–138.

Buckley, G. L., Bain, N. R., Luginbuhl, A. M. & Dyer, M. L. (2004). Adding an "active learning" component to a large lecture course. *Journal of Geography*, *103*, 231–237.
Burgstahler, S. & Cronheim, D. (2001). Supporting peer–peer and mentor–protege relationships on the internet. *Journal of Research on Technology in Education*, *34*, 1, 59–74.
Cascio, T. & Gasker, J. (2001). Everyone has a shining side: computer-mediated mentoring in social work education. *Journal of Social Work Education*, *37*, 2, 283–293.
Chang, M.-M. (2001). *Effects of embedded relevance enhancement within a computer based interactive multimedia program for English as a foreign language learners*. West Lafayette, IN: Purdue University.
Cifuentes, L. & Shih, Y.-c. D. (2001). Teaching and learning online: a collaboration between U.S. and Taiwanese students. *Journal of Research on Computing in Education*, *33*, 4, 456–464.
Davenport, N. A. M. (2006). Connecting preservice teachers with students: using email to build skills for teaching writing. *Journal of Reading Education*, *31*, 2, 13–19.
Dunlap, D. R., Neale, D. C. & Carroll, J. M. (2000). Teacher collaboration in a networked community. *Educational Technology & Society*, *3*, 3, 442–454.
Gollwitzer, P. M. (1999). Implementation intentions. Strong effects of simple plans. *American Psychologist*, *54*, 7, 493–503.
Huang, W., Huang, W., Diefes-Dux, H. & Imbrie, P. K. (2006). A preliminary validation of attention, relevance, confidence and satisfaction model-based instructional material motivational survey in a computer-based tutorial setting. *British Journal of Educational Technology*, *37*, 2, 243–259.
Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), *Instructional theories and models: an overview of their current status* (pp. 383–434). New York: Lawrence Erlbaum Associates, Publishers.
Keller, J. M. (1987a). Development and use of the ARCS model of motivational design. *Journal of Instructional Development*, *10*, 3, 2–10.
Keller, J. M. (1987b). Strategies for stimulating the motivation to learn. *Performance & Instruction*, *26*, 8, 1–7.
Keller, J. M. (1987c). The systematic process of motivational design. *Performance & Instruction*, *26*, 9, 1–8.
Keller, J. M. (1999). Using the ARCS motivational process in computer-based instruction and distance education. In M. D. Svinicki (Series Ed.) & M. Theall (Volume Ed.), *New Directions for Teaching and Learning: Motivation from Within: Approaches for Encouraging Faculty and Students to Excell* (Number 78, pp. 39–47). San Francisco: Jossey-Bass.
Keller, J. M. (2004a). A predictive model of motivation, volition, and multimedia learning. In *Proceedings of the International Symposium & Conference, Educational Media in Schools* (pp. 9–19). Osaka, Japan: Kansai University.
Keller, J. M. (2004b). *A predictive model of motivation, volition, and multimedia learning*. Paper presented at the International Symposium & Conference, Educational Media in Schools, Osaka, Japan.
Keller, J. M. & Subhiyah, R. (1993). *Course interest survey*. Tallahassee, FL: Instructional Systems Program, Florida State University.
Kuhl, J. (1987). Action control: the maintenance of motivational states. In F. Halisch & J. Kuhl (Eds), *Motivation, intention and volition* (pp. 279–291). Berlin, Germany: Springer.
Naime-Diefenbach, B. N. (1991). *Validation of attention and confidence as independent components of the ARCS motivational model*. Unpublished doctoral dissertation, Florida State University, Tallahassee, Florida.
Nicosia, G. (2005). Developing an online writing intensive course: will it work for public speaking? *International Journal of Instructional Media*, *32*, 2, 163–170.
Pintrich, P. R. & Schunk, D. H. (2002). *Motivation in education. theory, research, and applications* (Vol. 2). Upper Saddle River, NJ: Merrill Prentice Hall.
Poole, D. M. (2000). An email activity: preservice teachers' perceptions of authenticity. *Journal of Technology and Teacher Education*, *8*, 1, 13–28.

Small, R. V. & Gluck, M. (1994). The relationship of motivational conditions to effective instructional attributes: a magnitude scaling approach. *Educational Technology, 34*, 8, 33–40.
Springgay, S. (2005). Thinking through bodies: bodied encounters and the process of meaning making in an e-mail generated art project. *Studies in Art Education, 47*, 1, 34–50.
Suzuki, K. & Keller, J. M. (1996). *Creation and cultural validation of an ARCS motivational design matrix*. Paper presented at The Annual Meeting of the Japanese Association for Educational Technology, Kanazawa, Japan.
van der Meij, H. & Boersma, K. (2002). Email use in elementary school: an analysis of exchange patterns and content. *British Journal of Educational Technology, 33*, 2, 189–200.
Visser, J. & Keller, J. M. (1990). The clinical use of motivaitonal messages: an inquiry into the validity of the ARCS model of motivational design. *Instructional Science, 19*, 467–500.
Woods, R. H. (2002). How much communications is enough in online courses?: exploring the relationship between frequency of instructor-initiated personal email and learners' perceptions of and participation in online learning. *International Journal of Instructional Media, 29*, 4, 377–394.