How to teach software programming? Using Affective Teaching Method and Social Network to Enhance the Learning Motivation in Programming Courses - An Example on Facebook

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Abstract: How to teach software programming? Students have many problems when learning programming. Programming is important in high school computer class, but teacher usually don't like to teach in Taipei, Taiwan. This research advances an idea that designing an Affective Processing Programming Teaching Plan (APPTP) and using Facebook group to support students' learning. Depending on our quasi-experimental study, we found that Facebook group has good usability in courses, and APPTP can enhance motivation in programming courses.

Keywords: Affective Teaching, Programming teaching, Facebook, Learning motivation

Introduction

Students may face many problems when learning programming (While 1997, as cited in Wang, 2008). Some researchers had point out many causes that why students face may problem. In Taipei, Taiwan, programming is the second important courses schedule in seventeen high schools. But half of them didn't teach programming (Sun, 2003). In our research, for student we chose an easy to learn programming language: Processing, and design a new teaching plan with affective teaching and Facebook group. We want to know:

1. Can APPTP enhance the learning motivation in programming courses?
2. How is the usability of Facebook group in APPTP for high school students?
3. Does the usability of Facebook group in APPTP affect the programming motivation?

1. Literature review

1.1 Affective Teaching

Affective educational is use of teaching and learning activities, leading to the emotional level of the thinking of learners' progress from the level of knowledge. Not only expanding affective self-acceptance, but also enhancing personal norms, feelings, attitudes, and moral. So that learners can improve the level of life.Affective education is a humane education trend; the subject of it is humanistic spirit. According to Chin-Tsai Lin "Teaching Principles"(P.286), the connotation of affective education contain self-concept, valuation, altruistic behavior, the ultimate concern, language, art appreciation, moral judgments, and religious beliefs.

To achieve the purpose of affective education must start from the affective teaching. Affective teaching emphasis on learning lead to stimulation, integration, confluent, interactive, exploratory, complete, attempting to enable students to both the skills, knowledge and affective. According to Chin-Tsai Lin "Teaching Principles"(P.287), the connotation of affective teaching divided into the following part:

(1) Maintain personal values
(2) Promote the need of social interaction
(3) Emotional guidance and counseling
(4) Assist students to become socialization
(5) Provide the local culture feelings and historical context

According to Yu-Hsin Huang "The research of affective teaching applied in action/problem-solving general course" (2010), affective teaching can lead students:

(1) Inspire responsibility and self-confident from their real experience.
(2) Learning positive attitude from their personal experience.
(3) To increase their power of positive psychology, and to stimulate personal growth.

In our research, we would take the advantage of Affective learning to programming courses. In the courses begins, teacher shared his personal painful learning experience to all and some student also. We would not just explain the programming rules and spec. We talk about what can program do and make our life more convenient, and how to use positive attitude to face the painful feeling when program compile fail.

1.2 Facebook in teaching

Mazer(2007, as site in Caroline Lego Muñoz, 2009) said that Facebook can use to increase both teacher-student and student-student interaction, teachers and students can share some useful likes and events by everyone's profiles containing personal information, interests, background, online, and "friends", which can enhance students' motivation, affective learning. Facebook's penetration in Taiwan is 54.88% compared to the country's population (socialbakers.com, 2012). Facebook is the biggest social network in Taiwan. We create a Facebook group to help students' post their questions or feelings to the group in the courses if they don't want to raise their hands.

2. Research Methods

2.1 Quasi-Experimental Study

Due to the research limit, we use experimental research to verification. Our research steps are following:

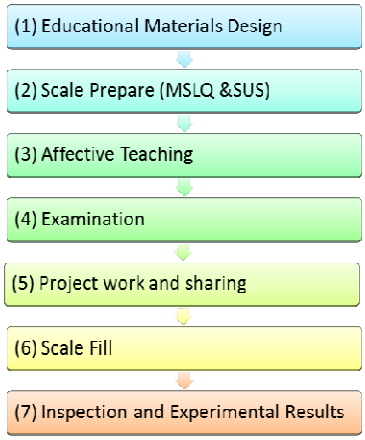

Figure 1. The research steps in this quasi-experimental study

In (1), we design a 3 hour teaching plan by Affective Teaching. We chose two questionnaire tests if this teaching plan can enhance the learning motivation in programming courses and if Facebook's user usability is fit to high school students. After the teaching, there are 10 question examinations and a project work to students to review our courses. Students have to share their project to all in the classroom and Facebook group. The teacher would comment each project and encourage each one. Finally they will receive our questionnaire.

2.2 Research subjects

We have Single class, 15 class members from Kaohsiung, Taiwan and 8 valid questionnaires. In the questionnaires, 3 freshman in high school, 4 second year of high school, 1 senior in high school, 1 university students. Almost all members have some C language programming courses experience, but don't well at that.

2.3 APPTP: Affective Processing Programming Teaching Plan

Traditional programming courses teach C or C++, but it is too hard to learn. Instantly we chose Processing as our programming language. It was very easy to learn for students, many people who don't have computer science background like to use Processing to make Digital Arts. In the Internet, Processing have huge example codes and good references. In our plan we teach the fundamental knowledge of programming. We hope in 3 hours teaching students can make a mini digital art or game project work.

Table 1. APPTP details and schedule

APPTP Name: Super-simple digital Art and Game programming: Processing
Schedule: Class1 13:20~14:10: Courses Class2 14:20~15:10: Courses and Examination (10 questions) Class3 15:20~16:10: Project implementation, sharing to Facebook. Questionnaire fills.
Class Principle: 1. We will program together in teaching time. 2. *You can ask any questions at any time; don't care about interrupt the class.* 3. *You can ask questions by raise hands or post to Facebook.*

Course topic:

1. Introduce Class Facebook Group
2. *Sharing teacher's and everyone's painful experience about learning programming*
3. Processing: Origin
4. Processing related projects and works.
5. Processing IDE introduce
6. Processing language basic structure
7. Mouse Control
8. Keyboard Control
9. Processing related Resources

2.4 Questionnaire: SUS

System Usability Scale (SUS) is a simple, 10-item attitude Likert scale. It is used to test a system's subjective assessments of usability. It can test three aspects (Brooke, J. , 1996):

1. effectiveness (can users successfully achieve their objectives)
2. efficiency (how much effort and resource is expended in achieving those objectives)
3. satisfaction (was the experience satisfactory)

We use SUS to test Facebook group's usability in the teaching environment to subjects.

2.5 Questionnaire: MSLQ

MSLQ (Motivated Strategies for Learning Questionnaire) is design by Pintrich(1993) to test students' learning motivation. It has 7-item attitude Likert scale, to verify that if the APPTP can enhance the learning motivation in programming courses, we selected 31 questions in 6 dimensions of motivation in MSLQ.

2.6 Limitations of this study

Because our quasi-experimental study and the students' quantity are few (15), we can't simplicity inference to all students and situations.

3. Experimental Results

3.1 SUS - descriptive statistics

Using the SUS's formula the average score is between 0 and 100. Our average score is 76.5625 that the usability is "good" and close to "excellent" (Bangor, 2008). Even the Min score in our research is 67.5 that the usability is "OK".

Table 2. SUS descriptive statistics

Average	Max	Min	Standard deviation	Median
76.5625	85	67.5	5.334775	76.25

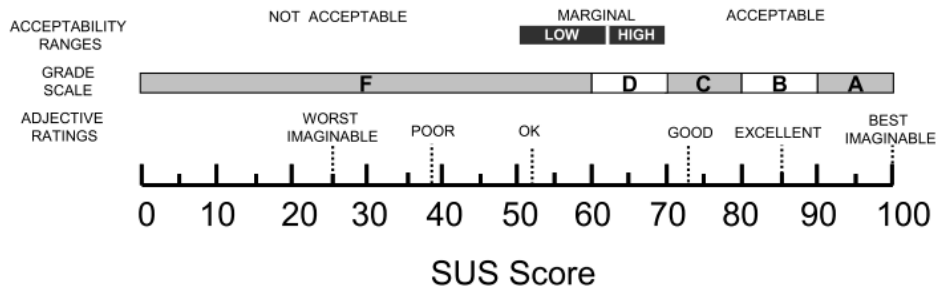

Figure 2. SUS acceptability ranges (Bangor, 2008).

3.2 MSLQ - descriptive statistics

By MSLQ's descriptive statistics, APPTP is well in enhancing students' learning motivation. Following are the results:

1. In intrinsic goal orientation, we have 5.81 average score (max is 7) that the plan can excite the students' intrinsic goal orientation.
2. In Task value, we have 5.77 that students' like and feel useful to the courses.
3. In Control of learning and Self-efficacy, we have 5.43 and 5.02 average score that the students confirm the courses and feel confidence to them.
4. In Extrinsic goal orientation and Test anxiety, we have 4.12 and 3.57 that the exam score is not important to the students. And so on, our APPTP is not stress on exam score.

Table 3. MSLQ descriptive statistics

MSLQ Dimensions	Average	Standard deviation
Intrinsic goal orientation	5.81	1.11
Extrinsic goal orientation	4.12	1.79
Task value	5.77	1.15
Control of learning	5.43	1.54
Self-efficacy	5.02	1.43
Test anxiety(*)	3.57	1.81

* negative scoring

3.3 SUS and MSLQ

We use Pearson Correlation Coefficient to test that weather the Facebook group usability influence APPTP , the r value is -.365 and not significant which means we don't know the relationship in this two dimension.

Table 4. Pearson Correlation Coefficient between SUS and MSLQ

Pearson Correlation Coefficient	SUS score
MSLQ	-.365

3.4 Facebook group using status

We discover that few students ask questions by Facebook, they would like raise their hands. They usually "Like" other one's post, but it didn't decrease their attention at the teacher by teacher's experience. Few students who are good at programming usually post their project and creative game and art.

Table 5. Facebook group using status (include teacher)

Type	Number of Times
Asks	2
Chats	4
Project work post	20
Comments	80
Likes	212

3.5 Open questions

We received 5 text responses in Chinese. 2 students said the Facebook Group is useful. And the other 2 students feel interest to courses. The responses are translated below:

Table 6. Open question feedbacks

1	So this is the Processing！Ha Ha！ Original text: “原來這就是Processing!XD”
2	This is super useful. If I have a problem, I’ll ask on the Facebook. Original text: "超有用的啦XD 如果我有問題就在FB上問~"
3	This is a good idea to hand in papers and interact in Facebook community. In addition, let the introverted students posting. Ha Ha！ Original text: "FB社團的創想很好 方便教作業及互動 也可以讓一些內向的同學PO文發言XD 加油~!"
4	It’s so high to learning the course. The program can help me to write something that C++ can’t do. After this courses I want to do more research in this scopes. Thank you! How nice this courses~^^ Original text: "學這門課，讓我熱血沸騰>< 讓我知道，這程式可以寫出C++寫不出來的東西 這堂課結束，我蠻想在專研這塊 謝謝~ 很棒的一堂課~~^^"
5	Thank you. Because of the time, teacher speaks fast, let me misunderstand. But it’s Okay. I learn a little. The class content is fun and interesting. Original text: 謝謝囉~~ 因爲時間ㄉ關系 把內容講快 讓我有點聽不懂 不過沒關係 至少有學到一點點^^ 這次上課內容既好玩又有趣~

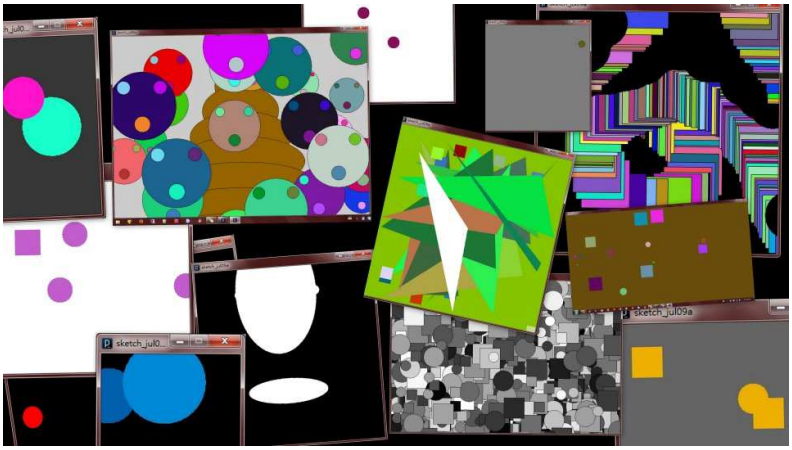

Figure 3. Students’ Project screenshots

4. Conclusion

In our research, we have to answer following three questions:

1. Can APPTP enhance learning motivation in programming courses?

With our quasi-experimental study (MSLQ), APPTP is good at increasing intrinsic goal orientation, task value, control of learning, self-efficacy, but not good at task value and test anxiety.

2. How is the usability of Facebook group in APPTP for high school students?
With our quasi-experimental study (SUS), Facebook's usability at APPTP is "good", even close to "excellent" (80).

3. Does the usability of Facebook group in APPTP affect the programming motivation?
It's not significant that we use Pearson Correlation Coefficient to test, the r value is -.365 which means we don't know the relationship in this two dimension.

If teachers who don't well at programming teaching or want to increase students' programming motivation, they can try to use APPTP. All in all, we would try APPTP in a normal class in the future.

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