Designing a project management e-course by using project based learning

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Abstract

The aim of this study is designing an e-course system for Project Management courses. The primary objective of the system is providing course materials for students and increasing the course success. The e-course platform will assist the students for changing their negative feelings with positive ones such as when they feel anxiety, feel of failing the course or having pre convinced attitudes for the course. The e-course platform will has “Cognitive Learning Tool”, “Learning Cards for Key Terms”, “Key Term Matching”, “Cognitive Concept Maps” and “Online Adaptive Examination” modules inside. For analyzing the students’ needs a survey was conducted. Survey is organized based on to the first eight steps of project based learning approach. Survey results show that validity of survey is high (Cronbach’s alfa, 0.86), and also significant correlations obtained between factors. These results state that e-courses should be supported with project based learning approach and real life projects.

Keywords: Web based learning; project based learning; e-course; Bloom’s Taxonomy.

1. Introduction

Nowadays project management is so important for rapidly developing information and communication technologies (ICT). Even in production or service sector, organizations have to consider project management life cycles and its activities. For this reason, project management concepts must be learned effectively in graduate or undergraduate level programs. But, there are different and unsolved handicaps to teach project management to students. Major handicaps may be classified as a) working in team to make project activities, b) collaborating with team members, c) communicating with project stakeholders, d) concluding activities at deadlines. These handicaps can be solved when project members able to communicate with stakeholders, share information with team members; critical thinking when requires making decision. These abilities may be gained for project management when project based learning approach applied as student centered framework. Project based learning is student centered approach and used for acquiring skills such as critical thinking, collaboration, communication, and problem solving (Lam, 2009). In authentic constructivist e-learning environment, project based learning can be used as pedagogical design

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paradigm to situated opportunities (Information, Action, Cognitive constraints, Goals). Project based learning engages students in designing and creating products that meet authentic needs (Zualkernan, 2006).

Sort of different project management courses are teaching in online mode as synchronous or asynchronous and probably these courses were developed according to the instructional design approach. But, interactive education tools may provide additional support to teach actively enrolled project management courses. Project based learning (PBL) approach will give a new direction to teach Project Management courses in an active way. Conventional teaching styles cannot support active student activities. PBL supported web based online e-courses may give active project member roles to the students. Main output of online teaching for scientific concepts of the project management and development is the project development report. So these concepts can be learned in interactive way for enforcing the students. E-course materials and management tools have to develop with interactive approaches by taking into consideration of the PBL.

2. Designing online project management e-course(PMeC)

Project based learning is directly related with curriculum of the course. In project management teaching, PBL can be used to trigger students for defining problems and sub problems for trying to solve them. PBL has a constructivist nature to create knowledge and for getting resolutions. Also it gives freedom of work to students with time independency. PBL also based on the real life problems, so, project management milestones may be considered in this viewpoint. In PBL process, students may learn actively by taking active role in projects. This approach is widely believed to be a powerful teaching strategy that would enhance student motivation and promote self-directed learning (Blumenfeld et al., 1991). Students may attend into the same small groups to collaborate with each other. Thus they can reach an integrated and collective output over a period of time. They make requirements analysis for a problem by searching facts in query session, debating ideas, making estimations, collecting and analyzing data, inference conclusions, and communicating each other for comparing and integrating findings (Lam et al., 2009). For designing an e-learning context which supports students’ requirements and cognitive abilities will be possible not only the students’ active involvement to the system but also they needed the teachers’ motivation and support.

In e-learning environment, modules which will be designed based on the learning styles of the students, will allow students to improve cognitive abilities and continuous learning of the project management curriculum. Thus, scientifically matured project reports and their activity results will be generated by students. Other goals to improve students’ successes in project management may be listed as a) e-course tools and e-material development to keep stable motivation level to the students, b) web based tracking the students and their projects.

New education applications will be developed based on the students learning styles to guarantee the students achievements. Students when follows the e-course system their cognitive overloads and flows can be monitored and system interactively generates reasons or redirections to help them. This online PMC system will be tracked and generated reports according to the students’ learning curves, cognitive overloads and learning styles. By using this analysis results, learning problems of the students will be identified to help them actively.

PMeC will be developed web based and e-materials will be help students to achieve learning goals of the project management course. Main outcome of the PMeC, project report, will be support the enterprise quality standardizations of project development processes.

PMeC will be designed by regarding the students’ needs and expectations, learning abilities and strategies, cognitive styles, cognitive overload capacities, visual reading speeds and perception levels of visual materials. Student centered e-course environment and e-material will be implemented at the end of the evaluation of test results of the prototype usages. In PMeC development project, project based learning approach will be implemented to support students and following tasks will be considered for success of this e-course project.

1) Defining the PMeC curriculum and scheduling e-course activities,
2) Defining the goals and sub goals with gaining of e-course by using Bloom Taxonomy,
3) Designing scenarios and interactive animations for e-course unites.
4) Designing interactive cognitive maps,
5) Preparing quizzes for assessing learning of concepts and operational knowledge of e-course unites,
6) Student manual designing for teaching e-course activities systematically ,
7) Arranging a debate forum to students for making discussions for solutions of different case studies,
8) Creating cross word puzzles to support learning retention.
9) Designing an infrastructure to present PMcE both synchronous and asynchronous.
10) Surveying learning confusions, false-lack learning topics of project management courses by analyzing previous student groups.
11) By using benchmarks from previous course results, course topics, activities and scenarios will be created,
12) Designing scenarios for fundamental activities that planned to learned in each unites,
13) By regarding learning styles (Felder-Silverman, Felder-Solomon) of students designing content flow and sequence of learning tools,
14) To determine contribution of different activities on learning, evaluation studies will be implemented on scenario based hypothesis,
15) Students who gets project management course in class and e-class are evaluated by same final exam to benchmark the PMeC advantages,
16) Students’ needs and expectations will be determined depends on end user evaluation tests in course coverage,
17) Cognitive overloads will be measured for end users,
18) E-reading speeds will be measured for end users,
19) Capacity of visual item perception in e-learning environment will be measured for end users,
20) Short and long term memory capacities will be measured for end users,
21) Critical thinking and collaborative learning surveys will be implemented to the students,
22) Collecting and analyzing data of end user usability evaluations and system performance,
23) Implementing system usability tests for PMeC design,
24) Determining evaluation metrics for different e-course modules’ learning activities,
25) Creating reports for marks of all activities in different unites as a students’ transcript in e-course system,
26) Creating reports for the attendance of each students to the PMeC system,
27) Developing interactive project development tool to like a wizard to help students for different project management reports (project requirements analysis, progress reports, design reports, test reports, etc.),
28) Proposing different project management topics for students and putting the milestones for the important tasks.

As stated in figure 1, e-course materials will be designed according to the project based learning approach. First of all, curriculum should be designed according to the stages of the project based learning. For each activity should be started with defining main and sub goals by determining the problem.

![Figure 1. Stages of the Project based learning](image)

After the development of the PMeC system, lecturers will be tested the e-course systems according to the curriculum and interface attributes. Selected groups will follow the PMeC to learn project management courses. After the learned each unite of the project management course, will be supported with the adaptive exam generator. As well known that computer based adaptive testing system is an intelligent system which helps the students to answer the questions from hard level to simple level. When a student gives a wrong answer to the question, second question is presented from another pool that keeps the simple questions inside. Adaptive exam generator can be used
to evaluate and assess the students learning and cognitive abilities well situated form. This way helps to determine learning curves, cognitive flows, and active learning strategies correctly.

Cognitive flow shows learning concentration and motivation of the students. The flow is an optimal experience state where people are fully involved into the activity, focused, lose self-consciousness, and they feel in control of their environment (Csikszentmihalyi, 1975). Csikszentmihalyi (1975, 1990, 1993, 1996) indicates the dimensions of the flow experience as clear goals and immediate feedback; equilibrium between the level of challenge and personal skill; merging of action and awareness; focused concentration; sense of potential control; loss of self-consciousness; altered sense of time; and experience becoming auto-telic or self-rewarding. Cognitive flow results of the students indicate the learning depth of the topics. By using cognitive flows, lack of learning concepts may be revealed. Students may be directed to learn the specific concepts which have lack of learning.

3. Methods

An e-course covers dimensions of system management, distance education techniques, technical and communications. Interaction and communication among learners can be provided by e-mail, forum, and blogs. Learning management systems can be categorized as resources and communication tools for groups. Resources are weekly course curriculum, navigation model, news and announcements, students’ home pages and profiles, calendar tool, searching tool, bookmarks, multimedia resources, file upload interfaces. Education systems cover methods which are related with learning theories. These methods support students learning styles. E-learning has advantages from the mobility and interactivity viewpoint, but, it has lack of pedagogical support to students. Thus we cannot say e-learning has more quality than conservative teaching methods. For removing this disadvantage of e-learning, project based learning approach can be used to create more interactivity and control on learning. Education system has not only tutorials but also guides the students to learn effectively and pedagogically. In order to prevent creativity of e-learning environments, e-course contents should include non-essential knowledge for students to learn contents just in time. Also e-learning systems have advantages to give opportunities to students to gain different abilities. An instructional design model, guides an education process to manage, plan, develop and implement an e-course. One of the instructional design models is ADDIE (Analysis, Design, Development, Implementation, and Evaluation) (McGriff, 2000). According to the ADDIE, education environment is being analyzed and after then education design realized, education content is being developed and presented to the students to acceptance testing. Forthcoming sections cover the steps of the ADDIE.

3.1. Analyzing Course Requirements

Instructional designer have to analysis requirements of the course content. In this phase, a) defining curriculum for e-course, b) e-content preferences, c) learner preferences, d) pedagogical approaches should be described. In ADDIE model, analysis phase is documented according to the Figure 2.

![Figure 2. Instructional design methodology ADDIE and analysis activities](image-url)
a) **Defining curriculum and course content:** Curriculum design is critical point for an e-course development. To give course unites in efficient way, some of unites have to divided into the sub modules. By this way, cognitive loads of the each module may be balanced for the students. Table 1 shows an example curriculum for project management course. Also learning objectives of the each module has to be detailed.

| Unite 1: Introduction to Project Management |
|--------------------------------------------|
| Unite 2: An overview of project planning |
| Unite 3: Programme management and project evaluation |
| Unite 4: Selection of a project approach |
| Unite 5: Project effort estimation |
| Unite 6: Activity Planning |
| Unite 7: Risk management |
| Unite 8: Resource allocation |
| Unite 9: Monitoring and control |
| Unite 10: Managing contracts, people and organizing team |

b) **E-content attributes:** After the defining objectives of the modules, instruction designer should have to decide how to give the content and which granularity. Cognitive maps, crossword puzzles, computer adaptive tests, dynamic presentations should be granulized for each unite as a module. Also, cognitive loads of each module have to balance with levels of cognitive flows. E-content analysis covers to determine resources for learning and teaching processes. For using these resources again in different places, the content resources should be designed reusable by using SCORM standard. Thus, an e-course has to include in different diversity of learning objects. Learning objects can be Java Applets, animations, videos, images, electronic documents, web pages and web portals. A prerequisite of content is important to balance the knowledge level of students. Prerequisite courses should be identified to put borders for students who are able to learn forthcoming e-course.

c) **Learner attributes:** Demographics, learning styles, cognitive styles of students should be determined to design most suitable contents. For supporting individual motivation and goals of students, their average age information is essential to define content coverage. ICT knowledge of students is important point for tracking web based course contents. When students are able to use web tools and resources they can easily and rapidly adapted them to use e-course utilities.

d) **Pedagogical approaches:** Learning theories, for example, constructivist learning theory is suitable for project based learning activities. In authentic constructivist e-learning environment, project based learning can be used as pedagogical design paradigm to situated opportunities (Information, Action, Cognitive constraints, Goals). Project based learning engages students in designing and creating products that meet authentic needs.

3.2. **Instructional Design**

Instructional design activities cover learning goals and objectives, evaluation assessment strategies, content sequence and learning strategies. To define learning goals and objectives, it needed to develop a manual for using by students and teachers. Bloom’s Taxonomy is revised by Anderson and Krathwohl (2001, pp.67-68) revisited the cognitive domain in the learning taxonomy;

a) Creating (putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing),

b) Evaluating (making judgments based on criteria and standards through checking and critiquing), analyzing (breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.),

c) Applying (Carrying out or using a procedure through executing, or implementing.),

d) Understanding(constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining),

e) Remembering (retrieving, recognizing, and recalling relevant knowledge from long-term memory).
For specifying learning goals and objectives modularly, instructional design document should be prepared according to the Table 2.

| Instructional design (determining goals and objectives, evaluation and content sequences) |
|---|---|---|
| Specifying learning objectives | Module I | Module II | Module III |
| **Objectives** (Revised Bloom taxonomy) | **Remembering** | **Understanding** | **Applying** |
| Specifying learning objectives | **Remembering** | **Understanding** | **Applying** |
| **Remembering** | Obj.1–Project management terminology, specific facts (know, define, memorize, repeat, list, recall, name, relate) | Obj.2–Project planning (restate, discuss, describe, explain, express, identify, locate, recognize, report, review) | Obj.3– Programme management and project evaluation (apply, employ, illustrate, demonstrate, use, translate, practice, operate, schedule, sketch) |
| **Understanding** | | | Obj.3– Selection of a project approach (apply, employ, illustrate, demonstrate, use, translate, practice, operate, schedule, sketch) |
| **Applying** | Obj.3– Programme management and project evaluation (apply, employ, illustrate, demonstrate, use, translate, practice, operate, schedule, sketch) | | |
| **Analyzing** | Obj.4– Project effort estimation (distinguish, analyze, differentiate, appraise, calculate, relate, experiment, test, compare, contrast, criticize, solve, diagram, inspect, debate, inventory, question, examine) | | |
| **Evaluating** | Obj.5– Activity Planning (compose, plan, propose, design, formulate, arrange, assemble, collect, construct, create, set up, manage, prepare) | | |
| **Creating** | | | Obj.6– Risk management (judge, appraise, evaluate, rate, compare, value, revise, score, select, choose, assess, estimate, measure) |

After the defining the goals and objectives, evaluation process has to taking into account according to the ADDIE model. To assess the students’ level of knowledge about the learning objectives, instruction designer should have to decide the evaluation process. Evaluation can be done by formative or summative way. The summative evaluation approach is implemented at the end of the instruction. The formative evaluation approach is implemented during the instruction process and continuous through learning process (Born, 2003). The formative or summative evaluation can be done by face-to-face, online with or without supervision (Peres & Pimenta, 2010).

### 3.3. Technical infrastructure of E-course

Adobe® Creative Suite® 4 Design Premium environment will be used to develop interactive animations and tools for students to follow Project Management courses. For designing course material following items will be considered and developed.

1. Unite Information of Course,
2. Screen label,
3. Sound,
4. Video,
5. Graphics,
6. Interaction and direction objects,
7. Background music,

Unite information of course have course name, unite name, and subsection information. Screen label presents animation sequences and their sorts. Interaction and direction objects cover helps and Manuals for students to use
dynamic contents. Pre-studies and requirement analysis for scenario preparation process, also, will be preceded based on the theoretical and application background of the course. Following section focuses on Project Management course for learning and teaching requirements. According to the Bloom’s Taxonomy, top activities, such as remembering and understanding can be gained by well and deeply defined of course goals and objectives. Thus, a survey is conducted to the students to obtain the expectations for an online project management course.

4. Requirements Analysis for online Project Management for Project Based Learning

Project management courses have some obstacles for both students and teachers. For surpassing these type problems, project management courses have to design by taking into account the project based learning approach. Student’s expectations and ICT abilities are major issues to handle in e-course environment. Requirements analysis questionnaire is constructed to survey students’ expectations from this life cycle of project management. By this way, e-course design can be considered to base on end user needs.

4.1. Demographics and Instrument

Engineering students who enrolled to “SE3001 Software Project Management” course were conducted with 30 itemed survey and items organized as listed in Appendix A. With a total number of 75 enrolled students to SE3001, including 54 (72%) males and 21 (28%) females. The average age is 22.1.

The questionnaire is designed with 30 items structured in 8 components. All items organized by using Likert 5 scale. “Defining goals” has only one item (Question27). Determining the problems factor includes 4 items (Questions 2, 3, 29 and 30). Defining the preferences report means the preparing the system and course specifications. It consists of 2 items (Questions 18 and 19). Defining evaluation metrics and qualifications has 6 different items (Questions 8, 9, 15, 20, 24, and 25). Creating and managing teams organized to survey most important points of the projects (Questions 1, 16, 17, 22, 23, 26, and 28). Defining sub problems and data collecting process covers 2 items (Questions 5 and 13). Defining working schedule consists 3 items (Questions 4, 6, and 12). Defining control points focuses on to evaluate status of the milestones in a project and it has 5 items (Questions 7, 10, 11, 14, and 21). Scores for components and the overall score can range from 1(strongly disagree) to 5 (strongly agree).

4.2. Results

Table 3 presents the mean and standard deviation values for each of the 5 likert scale of requirements analysis survey. It can be seen that general average of the questionnaire is 3.91. It means that subjects are almost agreeing with all statements which are defined in eight factors.

As proposed in project based learning approach, defining goals and defining working schedule are perceived as most important factors from students.

| Item No of survey | PBL Step | Average | Standard Deviations |
|-------------------|----------|---------|---------------------|
| #27               | 1. Defining goals | 4.16    | 0.55                |
| #2                | 2. Determining the problem | 3.80    | 0.87                |
| #29               | 2. Determining the problem | 4.00    | 0.82                |
| #3                | 2. Determining the problem | 4.12    | 0.78                |
| #30               | 2. Determining the problem | 4.24    | 0.83                |
| #18               | 3. Defining preferences of result report | 4.08    | 0.91                |
| #19               | 3. Defining preferences of result report | 4.12    | 0.73                |
| #15               | 4. Defining evaluation metrics and qualifications | 3.64    | 1.04                |
| #20               | 4. Defining evaluation metrics and qualifications | 3.80    | 1                   |
| #24               | 4. Defining evaluation metrics and qualifications | 3.64    | 0.91                |
| #25               | 4. Defining evaluation metrics and qualifications | 3.16    | 1.21                |
| #8                | 4. Defining evaluation metrics and qualifications | 4.12    | 0.73                |
| #9                | 4. Defining evaluation metrics and qualifications | 4.32    | 0.69                |
| #1                | 5. Creating and managing teams | 3.64    | 1.22                |
| #16               | 5. Creating and managing teams | 3.92    | 0.81                |
Survey items are grouped according to the first 8 factors of project based learning approach as listed below:
1. Defining goals,
2. Determining the problem,
3. Defining preferences of result report,
4. Defining evaluation metrics and qualifications,
5. Creating and managing teams,
6. Defining sub problems and data collecting process,
7. Defining working schedule,
8. Defining control points.

Descriptive statistics of factors represents that means of the factors between 3.66 and 4.16.

| Factor | Mean | Std. Deviation | N  |
|--------|------|----------------|----|
| Factor1| 4.16 | .55            | 75 |
| Factor2| 4.04 | .53            | 75 |
| Factor3| 4.10 | .70            | 75 |
| Factor4| 3.78 | .51            | 75 |
| Factor5| 3.66 | .39            | 75 |
| Factor6| 3.72 | .35            | 75 |
| Factor7| 4.13 | .53            | 75 |
| Factor8| 3.90 | .50            | 75 |

The Spearman correlation coefficient between different items on the questionnaire varied according to component. For the defining goals, coefficients ranged from 0.24 to 0.63 and were always significant, for the determining the problem, coefficients lay between 0.27 and 0.62 and were significant for most values, and for the defining the preferences of result report component, coefficients ranged from 0.26 to 0.63 and were significant for most values. For the defining the “defining evaluation metrics and qualifications” component, coefficients ranged from 0.25 to 0.85 and were significant for most values. For factor creating and managing teams, ranged from 0.31 to 0.70 and were significant for most values. Factor 6, defining sub problems and data collecting process, has significant correlations ranged from 0.28 to 0.85. Defining working schedule has significant correlation with other components, coefficients ranged from 0.37 to 0.62. For factor, defining control points, coefficients ranged from 0.24 and 0.73 and were significant for all factors. Validity of survey is good and Cronbach’s alpha was 0.81 for overall survey. Table 5 shows the significant correlation coefficients between numeric variables evaluated using Spearman’s correlation analysis.
5. Discussion

This study focuses on to investigate analysis and design steps of e-course from viewpoint of the students’ needs and expectations. As we argued before project management courses have obstacles at the starting point of creating and defining a project. Students who registered and passed Project Management course, state that creating and attending to a team most important point of the project management. Correlation matrix between factors also emphasis this assumption. Cronbach’s alpha was 0.86 for validity checking of eight factors.

As Table 5 represents, factor 1, “defining goals” has significant correlation with factor 2, “defining the problem” (rho=0.49, p<0.01), with factor 3, “defining preferences of result report” (rho=0.63, p<0.01) and with “defining the schedule” (rho=0.37, p<0.01).

Second factor, “determining the problem” has direct and significant correlations with “defining preferences of results report” (rho=0.45, p<0.01); “creating and managing teams” (rho=0.42, p<0.01), “defining working schedule” (rho=0.62, p<0.01) and “defining control points” (rho=0.37, p<0.01).

“Defining preferences of result report” component has significant correlation with “defining the evaluation metrics and qualifications” (rho=0.39, p<0.01) and “defining working schedule” (rho=0.48, p<0.01).

Factor 4, “defining evaluation metrics and qualifications” has significant correlation with “creating and managing teams” (rho=0.31, p<0.01), “Defining sub problems and data collecting process.” (rho=0.85, p<0.01), “Defining working schedule.” (rho=0.50, p<0.01), and “Defining control points.” (rho=0.57, p<0.01).

Creating and managing teams has direct and significant correlation with “Defining sub problems and data collecting process.” (rho=0.70, p<0.01), “Defining working schedule.” (rho=0.61, p<0.01), and “Defining control points.” (rho=0.61, p<0.01).

“Defining sub problems and data collecting process.” has significant correlation with “Defining working schedule.” (rho=0.59, p<0.01), and “Defining control points.” (rho=0.73, p<0.01).

Defining working schedule has direct significant correlation with “Defining control points.” (rho=0.43, p<0.01).

6. Conclusions

This paper emphasis the Project Management e-course design may be suitable for engineering students. As e-course design process covers curriculum design, pedagogical design and e-content design, most important point is creating proper teams and implementing project based learning activities. By this way, Project Management e-course can support all level students to learn project management activities. Creating and managing teams seems to be very vital factor for both project based learning and project management activities. Conducted survey results show that all activities have significant correlations with each other. Following conclusions can be obtained for project management e-course expectations from students those have experiences in project based learning stages:

1) Defining goals and project title is the starting point for a project,
2) Determining the problem scope and coverage,
3) Determining the reports,
4) Determining the evaluation metrics to evaluate project stages and quality assurance,
5) Team creation and management process seems to be most understandable phase for a project management,
6) Defining sub problems based on work breakdown structure to obtain detailed works.
7) Importance of working schedule is perceived well from students.
8) Defining control points is related with 5th, 6th and 7th factors.

Project based learning stages overlap with a well defined project management. These results of this study show that when a project management e-course designed, it should be taking into consideration of the constructivist project based learning approach.

Appendix A

1) Each members of the group will be chosen for the project according to the members’ academic success.
2) Project topics should be identified according to the experiences of project members in design, technology, risk and cost issues.
3) End users profile should be determined and projects must be implemented.
4) At the starting point, project members should be informed that each member has to support all activities in the project.
5) Work breakdown structure must be defined and each job has to assign to project member(s).
6) Each member has to involve actively in the each task activity.
7) Instructor has to control each wok pieces to evaluation of the project phases for groups in periodically.
8) For evaluation process, control list has to construct based on the criteria of weekly project phases.
9) Project members can be able to self appraise themselves on jobs of project.
10) Project members can criticize their project and group members.
11) Different project teams can evaluate and criticize each phases of the other teams’ projects.
12) Responsibilities should be declared to project members for each phase of the project.
13) Among different project members, innovative or creative proposals should be positively evaluated.
14) Project member supports to the project have to be evaluated in each phase according to their responsibilities.
15) Each phase have to be evaluated by team members as a group.
16) Team members have to be communicated each other by using e-mail, forums, blogs, or discussion boards.
17) Project teams have to be communicated each other by forums, blogs, or discussion boards.
18) Instructor has to define guidelines and hints for each phase of the project.
19) Instructor has to define project requirements in the course syllabus.
20) Team members, who do not work systematically, have to warn by e-course system.
21) Project members have to communicate with instructor by using e-course system for implementing weekly jobs of the project.
22) Students also can attend to another project.
23) Project members' interests, should be determined in advance.
24) Individual evaluation should be done after the evaluation process of the team work by instructor.
25) Individual assessments should be independent from team evaluations.
26) Good friends may be better to attend same project teams by this way controllability of project increased.
27) Project topics should be selected by project members in consensus.
28) Project members should be clustered into the mentally focused projects.
29) Project members should be focused on new service fields and new trends for selecting project topics.
30) Project topics should be selected from real world life.
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