# Estimation on Student Learning Status for Personalized computer programming E-learning environment

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## ABSTRACT

*According to the constant growth of Information Technology in current human life, departments like computer engineering,computerscience,softwareengineering,information technology and many such departments in several universities are been in demand. Normally teaching and learning the "programming languages" in these departments is one of the primary topics that are to be learned by students so as to develop new ideas and logics in this field. Writing a code for a given task is somewhat difficult job. Remembering the syntax in certain languages and combining the multiple statements is also difficult. Students who lack to grasp the fundamental concepts in a certain language also lack behind to produce basic programs in that language. This results further in lack of grasping the advanced concepts too. These weaknesses need to be remedied before learning the advanced concepts. Accordingly we come across to find a solution to improve the conceptual learning of the students. The main purpose behind this topic is to assist students in obtaining dynamic and optimal learning process. This can also result in knowing the learning status of each student. This can be achieved using SKP based SLSD (syntax Knowledge Point based Student Learning Status Description).This helps instructors to know individual student learning status.SKP based SLSD focuses on the syntactic knowledge called Syntax Knowledge Point(SKP) extracted from program source code. It combines all syntactic knowledge that should be learned by the students, then collects each student learning activities and finally each students understanding of SKP is estimated based on collected data. By using SKP based SLSD students learning status can be more detailed, better explained and defined by the system.*

**KEYWORD:-***SKP, SLSD, estimation, personalization*

## INTRODUCTION

As the field IT is growing rapidly, departments like Computer Science, Computer Engineering, Software Engineering, Information Technology and Computer Business are in great demand. Computer programming is the very fundamental topic learned and taught in this field. Computer programming includes 4 basic tasks – analysis, design, implementation and maintenance.

Analysis includes study of problem statement. Design includes flowcharts, algorithms. Implementation means translation of idea into a form of code in certain programming languages.Maintainance includes testing and checking whether specified requirements meet actual requirements. Implementation is a difficult task due to syntax and code writing to solve a problem statement.

This concept helps students to optimally learn process according to there learning status. To remedy weaknesses in computer programming for students, personalized e-learning environment is proposed. Aim of personalized e-learning is to enhance learning skills of student.SasithornChookaew's System[5] promoted students conceptual learning,learningplan,sequentiallearning.Hiroshi Taguchi's method[7] recommend an exercise on his/her score in programming language.

Personalized programming e-learning uses method SKP based SLSD (Student Knowledge Point based Student Learning Status Description) for solutions to issues in above system. The remaining section describes SKP, extraction of SKP, the algorithm, implementing prototype system and verifies correctness of SKP.

Issues in implemented studies:

- It should be detailed.
- It should be well defined.
- It should be well designed.

**A] Syntax Knowledge Point (SKP):**

A source code can be shown as tree structure called syntax tree. Every node in this tree has its own type such as symbol, expression or statement and it performs special role for its parent.

**B] SKP extraction algorithm:**

- Get syntax tree of source code.
- Name node type and role.
- Name SKP.

**C] SKP based student learning status:**

The status of student is estimated upon his learning activity history.

- **SKP set:**

Shows SKP set learned by student.

- **Student learning activity and history:**

History is list of learning activities recorded. Learning activities can be read , correct answer , wrong answer.

- **Estimation of understanding of SKP:**

Based on student learning history the understanding value can be estimated. Based on accuracy of student's answer.

- **Student learning status:**

Based on SKP set, learning activity and history, estimated understanding the learning status can be generated for each student.

Each and every learner has its own impetus, aspect and reaction towards learning and teaching environment. Smith and Kolb [1] stated students should reject the environment which is not perfect for his own learning style.

Design of learning environment is the fundamental need of learning style for effective learning .There is a trend to thesis that personalization is an ubiquitous feature of e-learning. To learn learners have there own qualities such as cognitive style , learning style , studying habits , media preference , background information , abilities , impetus , expectation and time.

The main purpose of this paper is to define different means to enable students choose their own learning track and establish conditions to develop unique online courses as per individual learner's need.The paper elaborates a link between learning style and rules of developing online courses.

## PSYCHOLOGICAL BACKGROUNDS OF PERSONALIZATION

Personalized learning problems, personalized learning styles and personalized learning achievement are used for deciding and promoting conceptual learning on programming in e-learning environment.

**1] Personalized learning problems:**

The concept effect relationship model is been used to diagnose the learning problem of students. There is a prerequisite sequence of studying any concept. For example variables and data types should be learned before array etc.

**2] Personalized learning achievement:**

The percentage of incorrect answers of each concept of student is shown. This percentage can be used to categorise student's achievement into 3 levels such as high, medium and low.

**3] Personalized learning styles:**

The sequential/global immersion plays an important role in deciding how student seek and process data. Sequential/global dimension are used to attain data on learning style of students. Sequential learning style has linear learning path. Global learning style uses holistic process.

## CODE EXTRACTION

```
public static String dynamicCompiler(Exercise exo, String code, User u) throws IOException {

// get classname

  String classname = getClassName (exo);

  String filename = classname + ".java";

 // get username

  String username = u.getAttachedUserName ();

 // get current time

  String currentTime = getCurrentTime ();

 // generate source code to compile

   String source = setSrcCode (username, classname, currentTime, code, exo);

  // create file path

  String rootExo = ROOT + username + "\\" + classname;

  String rootClass = rootExo + "\\" + currentTime;

  File dir = new File(rootClass);

  if ( !dir.exists() )

    dir.mkdirs ();

  // write code into file

    writeFile (dir, filename, source);

  // compile

   Boolean success = compile (dir, filename);
```

```
 // return compilation result

   if ( !success ) {

  result = setFailMsg(diagnostics);

 javaFileManager.close ();

 return result;

 }

 else {

 javaFileManager.close ();

// run program

result = run (rootClass, batName);

// get system output as result

result = getOutputResult (result, classname);

   }

return result;

 }

private static String setSrcCode (String username, String classname, String currentTime, String code, Exercise exo) {

return "package " + username + "." + Classname + "." + CurrentTime + "; \n\n" + exo.getContentHead () + "\n"
+ code + "\n" + exo.getContentFoot ();

 }

private static boolean compile(File dir, String filename) {

// associate file manager with file

Iterable<? extends JavaFileObject> it = javaFileManager.getJavaFileObjects (new File(dir,filename));

// generate compilation task

 CompilationTask task = javaCompiler.getTask (null, javaFileManager, diagnostics, Arrays.asList ("-d",
ROOT), null, it);

// compile

return task.call();

}

private static String setFailMsg(DiagnosticCollector<JavaFileObject> diagnostics) {

String result = "Compilation Failed:\n";

for (Diagnostic<?> diagnostic : diagnostics.getDiagnostics()) {

result += "   " + diagnostic.getKind() + "!\n";

result += "   At: " + diagnostic.getSource() + "\n";

result += "   Message: " + diagnostic.getMessage(null);

}

return result;
```

# RESULT AND DISCUSSION

```
public static void main(String[] args) {
        switchValue(100, 200);
}

private static void switchValue(int a, int b) {
        // display before switch
        System.out.println("Before switch: a=" + a + " b=" + b);

        // algorithm to fulfill
Write your code here...




        // display
        System.out.println("After switch:  a=" + a + " b=" + b);
}
}
```

```
public static void main(String[] args) {
        switchValue(100, 200);
}

private static void switchValue(int a, int b) {
        // display before switch
        System.out.println("Before switch: a=" + a + " b=" + b);

        // algorithm to fulfill
a = a + b;
b = a - b;
a = a - b;




        // display
        System.out.println("After switch:  a=" + a + " b=" + b);
}
}
```

**Result**
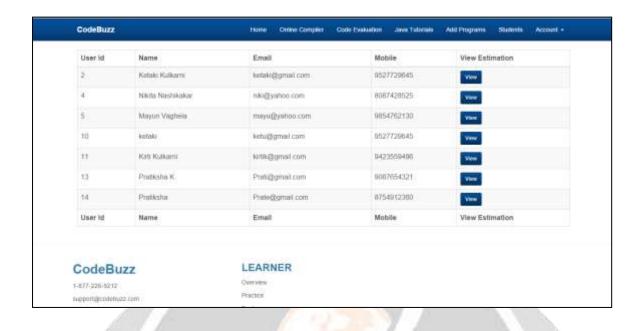
```
Compilation Success.
Result:
Before switch: a=100 b=200
After switch:  a=200 b=100
```

**Solution**

```
a = a + b;
b = a - b;
a = a - b;
```

## CONCLUSION

This helps in concluding with describing learning status of individual students for programming e-learning environment.

SKP is the concept that shows detailed learning status. Learning status can be considered main objective. It helps in getting learning status of each student, instructor needs to prepare questionnaire and accordingly provide score. Saves the time of instructor. This proposed method is only for C language and can be implemented for many other languages.

The proposed method consists of some issues that is planned to solve:

SKP is now used to check student understands and can be further elaborated for algorithm implementation.SKP extraction is not possible for compile time errors in source code. The proposed method is basically implemented to reduce instructor's job.

This paper helps in promoting undergraduate students the topic computer programming. The personalized information include learning problems, styles and achievements to decide the syllabus or study  material on a desired topic. The success of this method helps in enhancing the effect of e-learning environment.

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