Chapter 21

Utilization of Cooperative Instructional Method in the Preparation of Technology Education Students for Industries

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Aim

To understand how cooperative learning can be utilized in the training of technology education students for industries.

Learning Outcomes

At the end of this chapter, learners should be able to:

- Define cooperative instructional method.
- Justify the need for utilizing cooperative instructional method in technology education.
- List and describe five elements of cooperative instructional method.
- List four types of cooperative instruction.
- Enumerate two theories guiding cooperative instructional method.
- Outline five strategies for forming study groups or teams for effective instruction.

Introduction

Cooperative instructional method is gaining the attention of vocational educators who must prepare students for employment in today's industrial workplace which is increasingly focused on teamwork. It is an approach to instruction that provides opportunities for students to explore concepts and develop interpersonal skills that enhance their learning (Bridget, 2016). Cooperative instruction is currently the most vital approach to instruction delivery and training utilized by industries to enhance performance of technical

personnel. Researches comparing cooperative learning to individual and competitive learning have shown that cooperative instructional method promotes higher self-esteem among students and more positive attitudes. Daniel and Githui (2011), Van (2014) and several other researchers have reported that students who participate in cooperative learning groups realize greater achievement and greater levels of understanding of the subject matter, have an ability to absorb contents that require greater extent of thinking, as well as capable of retaining the knowledge they acquired for a longer period.

If technology education teacher is really ready to prepare the trainees to perform effectively in the increasing technologically driven industrial workplace, then the approach of delivering instruction to the trainees should reflect the needs of the workplace. The content of this unit therefore focuses on explaining the concept of cooperative instructional method, justifying the need for cooperative instruction in technology education, enumerating the elements of cooperative instruction, types of cooperative instruction, theories guiding cooperative instruction as well as strategies for forming study groups or teams for effective instruction.

Cooperative Instructional Method

Cooperative instructional method (COPIM) is a teaching methodology where small teams or groups of 5-8 trainees work collectively to achieve shared objectives under the guidance of a teacher as facilitator of learning. In the same vein, Rosser (2008) stated that this kind of instruction is planned in a way in which team mates interact collectively to achieve a shared instructional objective while being held responsible for group activity through personal evaluation assessments. The major thrust of this kind of instructional method is to engage trainees actively in knowledge acquisition activity; a kind of trainee coaching that is rare through other individualized traditional teaching methods.

Johnson, Johnson, and Smith (2000) stated that in a cooperative instructional settings, the instructor allocates trainees to small teams, provide a question to deliberate on, and moderates while trainees share ideas, elaborate as well as explain their opinions, find solution to questions and collectively arrive at a solution. The question appears to be open-ended and usually demand greater mental thought processes to find solution while tutors check the various teams to enhance active participation of members in the interaction process.

Justification for Utilizing Cooperative Instructional Method in Technology Education

Technology education is the foundation of industrial development in all ramifications. Technology education is a kind of education whose basic goal is to train individuals for job position in specific professions by empowering trainees with the technical skills, knowledge as well as attitude necessary for employment in recognized occupations. The Federal Republic of Nigeria (FRN, 2013) described technology education as a broad terminology connoting those components of educational process encompassing, in addition to general education, the study of technologies and associated sciences, the acquisition of attitudes, practical competencies understanding as well as knowledge associated with occupations in various sectors of economic and social life. This form of education offers trainees the competencies to survive, acquire knowledge as well as function as active citizens. This form of education decreases too much reliance of graduating trainees on government employment or white collar job.

One of central goal of technology education is to produce technical manpower to cope with industrial demands as well as enhance industrial development in Nigeria. An industry according to Hornby (2014) is a place where goods are produced from raw materials. If carried out in a sustainable manner, industrial activities have the possibilities of attaining several economic targets which will reduce job seekers, eradicate poverty, sex disparity as well as increase female access to quality education as well as better opportunities to scholarly activities and healthcare. The higher a nations' industrial resource, the better the possibility for economic development as well as growth.

For effective preparation of technology education students to cope with industrial demands, the instructional method used during the training process must reflect the needs of the industry. Research study on employers' needs by Ogundola, Popoola and Oke (2010) ranked team work skills as the number one trait that chief executives of organizations seek in new employees during the job selection process. In the industries, the technical staff are expected to interact, share ideas and work collectively on industrial projects or task as well as solve industrial problems to enhance productivity and industrial development. Acquiring team work skills or ability requires the use of cooperative instructional method which has the potentials of inculcating in the trainees team work skills needed to interact collectively with others to solve industrial problems.

Several research works attested to the efficiency of cooperative teaching instructional method in science and engineering courses. Jumoke and Idowu (2012) and Johnson, Johnson and Smith (2000) in separate studies revealed that comparing trainees tutored conventionally with trainees tutored in teams shows that trainees tutored in teams appear to display greater scholarly attainment, higher rational thinking as well as comprehension of delivered instructions, less disruptive attitude in class, less degree of anxiousness, show greater internal incentive to acquire knowledge, higher capacity to reason rationally from various views, better interaction ability with other trainees as well as mastery of the subject matter taught.

The use of group cooperative instructional method creates an environment for collective brainstorming amidst trainees in teams as they progress from one learning activity to the other. This helps to stimulate students' interest to learn as students are free to interact and help each other in the learning process. Effective adoption of cooperative instructional method in technology education institutions requires the use of appropriate strategy that will enhance successful usage. This will enable the students to interact cooperatively since they must have the required cooperative work skills needed to ensure smooth transition from school to work. This will in turn enhance students' performance in the industry where team work skills are currently in need.

Elements of Cooperative Instructional Method

Johnson, et al (2000), unveiled that five elements are required for effective cooperative instruction: positive interdependence, use of interpersonal skills (social skills), face to face promotive interaction, group processing and individual accountability.

Positive Interdependence: Interdependence is a characteristic of COPIM that allows students to relate with each other and help each other to achieve instructional task. Through positive interdependence, group mates are accountable to each other and depend on each other to attain stated objectives. When any group mate refuses to execute his/her task, the entire team suffers the result or outcome. Social interdependence occurs when product of trainees are influenced by actions of trainees themselves. Social interdependence occurs in two forms: positive interdependence (if activity of trainees enhances attainment of group objectives) and negative interdependence (if activity of trainees obstruct attainment of other trainee's objectives). Through the first type, heterogeneous groups learn to trust and rely on each trainee to attain mutual

objectives which requires exchange of ideas, resources, effort and encouragement.

Use of interpersonal skills (social skills): This is a characteristic of COPIM that allows the students to freely utilize their inborn human relation skills to communicate, reason together as well as share ideas as they learn together. Johnson et al (2000) revealed that by appropriate use of interpersonal skills, collective skills, trainees are motivated as well as assisted to build up and also acquire knowledge in decision making, leadership and trust building as well as conflict resolution competencies. This undermined the fact that small group interactions, conflict resolution strategies, round table discussions, and other team building activities provide an opportunity for students to develop the communication and social skills required for work in today's society.

Face-to-face promotive interaction: This is a characteristic of COPIM that stresses that though several of team activity might be executed personally, certain tasks should be executed jointly or collectively, with physically available team mates offering each other such brainstorming activities that encourage knowledge acquisition. Through face-to-face student interactions, students increase their communication skills and help each other to understand how tasks are completed.

Group processing: By team processing, group mates plan team objectives, from time to time and appraise if team mates are performing efficiently as well as recognize modifications needed to enhance group and also individual trainee performance. In cooperative learning, the role of the trainee is to execute or find solution to difficult team tasks and to interact collectively with every trainee to attain a common objective as well as individual target through brainstorming as well as problem resolution activity. Students concentrate their interest on allocated activity to increase their personal knowledge acquisition and knowledge acquisition of each team. For effective group processing, the teacher does not sit down because he exercises more control over learning activity but moves from one group to the other to monitor, control group learning activity, directs the learning process and also encourages students' participation. The teacher ensures order and also prevents students from moving from one group to the other.

Individual accountability: Individual accountability is a characteristic of COPIM that enhances individual student's participation and responsibility towards active brainstorming and sharing of ideas to support group learning

activity to achieve stated instructional objectives. By this characteristic, every trainee in a team is responsible for performing his/her portion of the group task and for getting conversant with processes for finding solution to problems encountered in the group.

Types of Cooperative Instruction

Daniel and Jonathan (2010) revealed that the common types of cooperative learning structures are: (1) teams-games-tournaments (2) student teams-achievement divisions (3) learning together (4) jigsaw.

Teams-Games-Tournaments is a type introduced by David Devries, Keith Edwards, and Robert Slavin. This type is closely related to STAD except that students do not take individual quizzes. Instead, students participate in scholarly games with mates from other groups and add scores to group points. Slavin found out in his research an increase in mean scores through the use of Teams-Games-Tournaments.

Student Teams-Achievement Divisions is a type of strategy created by Slavin Robert in which teams of 4 trainees work within their groups to acquire knowledge under the guidance of the instructor. Trainees take individualized questions that are related or weighted with previous performances, and then put together group points depending on degree to which the trainees in the team supersede past outcomes. Groups that achieve the appropriate criterion may gain some kind of reward from the teacher. Slavin recognized through his works an increase in average performance through use of this approach.

Learning together: Learning together was introduced by Roger Johnson and David Johnson in 1907 at the Minnesota University. Here, trainees acquire knowledge through interaction in 4 or 5 heterogeneous teams on a team activity report paper. In the course of their interaction, if trainees ask the instructor a question, the instructor would transfer the question to their teams to brainstorm and provide solution. After the team's deliberations, a team monitor or representative is selected to unveil the team's outcome to the study groups, and collect reward collectively. Grades are dependent on each trainee's input and the performance outcome of the team, but each team mate does not struggle with each other while brainstorming as in individualized instruction.

Jigsaw: This approach demands that trainees work in teams of 5 to 6 trainees as they brainstorm on learning material that has been segmented. Every trainee in a team is offered information alone, thereby helping each trainee to master his/her

subject matter or area of knowledge. When trainees in each group have received their brainstorming questions, each of them deliberates on it. Afterwards, team mates of various groups who have read the similar segments converge in "expert teams" to deliberate on various segments allocated to each. Afterwards, the team mates go back to their individual teams to share ideas on what they have learnt. At the end of the lesson, instructors examine each trainee and generate team grades on the basis of individual trainee's examination or measurement outcome.

Theories Guiding Cooperative Instructional Method

According to Slavin (1995), cooperative instruction is principally dependent on the constructivist theory as well as on social interdependence theory.

Constructivist Theory of Learning: Cooperative instruction is also based on constructivism theory. Knowledge is constructed, and transformed by trainees. The constructivists' theoretical proposition began from the works of Jean Piaget (1896–1980) and Jerome Bruner (1915-1999) in the year 1968. The theoretical framework for constructivism maintains that knowledge acquisition usually develops from ideas which a trainee is previously aware of; this previous idea is termed schema. This is because every idea or concept originates from previous idea. The proponents proposed that knowledge acquisition is efficient if a trainee is fully involved in knowledge acquisition activity instead of expecting to be a passive receptor of ideas (Devries & Zan, 2003). The knowledge acquisition procedure should be comprehended as what a trainee does by depending on previous mental ideas (schema) or through generation of novel ideas that create avenue for new concepts.

In creating novel ideas, trainees do not receive ideas passively from the instructor. Instructional delivery becomes a give and take business among all the participants in knowledge acquisition activity. Constructivist theoretical proposition philosophy is centred on the fact that ideas are developed by trainees as they make effort to derive meaning from experiences through interaction. Using constructivists approach, the goals of tutoring are to assist trainees build up learning as well as mental reasoning modalities, concentrate on trainees' and group's effective development of ideas as well as enhance knowledge acquisition through stimulating active discovery or inquiry approach to knowledge acquisition.

Social interdependence theory: Social interdependence theory offers a basis through which all group knowledge acquisition activity is developed. Cooperative instruction is centred on the theoretical proposition of social interdependence, originating from the researches of Morton Deutsch and Kurt Lewin at the university of Berlin in the early 1902 (Johnson, et al, 2000).

Slavin (1995) revealed that through social interdependence, team mates could enhance trainee's success by: (a) offering and accepting assistance as well as hints that are either personal or task-oriented; (b) interchanging information as well as resources, verbally expatiating deliberation as well as over viewing briefly, and transferring a trainee idea to another trainee; (c) offering and accepting responses on group activity as well as group behaviours, controlling input of every trainee; (d) questioning every trainee thinking pattern through brainstorming activity as well as encouragement to acquire knowledge; (e) planning greater efforts to acquire knowledge, motivating trainees to raise concentration level in execution of individual as well as group task; (f) jointly enhancing trainee's thinking as well as attitude; (g) involving trainees in personal development as well as small team competencies required for efficient group work; and (h) processing how efficient team mates are interacting collectively and how the manner of their team's efficiency could be periodically enhanced. A good understanding of this theoretical proposition will greatly enhance effective cooperative instruction.

Strategies for forming study groups or teams for effective cooperative instruction

Based on the evidence or outcome from extensive research from empirical studies and literature reviewed, the under listed strategies have been developed by the researchers:

a) Create study groups of 5-6 trainees for learning activity if student population is small. For very large class, the maximum number of students in a team should not exceed eight. When study groups are up to nine and above, many trainees may not participate actively and when students work in larger groups, the diversification of concepts as well as modalities which result in effective group learning could be missing.

b) Make the study groups heterogeneous in ability level. This involves mixing intelligent students with weak students, mixing males and females, and verbal and quiet students. In mixture of trainees in this pattern, less intelligent trainees benefit through observation of the manner in which brilliant trainees solve difficult problems, while the brilliant trainees benefit

through a comprehensive understanding of the course by tutoring other trainees.

c) Whenever the instructional tasks demand activity outside the classroom, create study groups whose participants have similar ample duration.

d) Administer to trainees tests items which capture every content area on the group measurement tasks or activity.

e) Appoint a trainee in each group (the process regulator) to make sure that each trainee comprehends the entire details in the group activity or measurement tasks submitted by the team. The regulator or monitor should as well ensure that each trainee plays active part in group interaction or brainstorming sections.

f) Ensure that each group is accountable for making sure inactive trainees do not benefit from scores or marks awarded to the entire team.

g) Utilize multiple rater system to create modification for group measurement and evaluation outcome.

h) Make available last resort alternative of quitting as well as firing. If a group has a trainee that is continuously not cooperative, the remaining group mates should inform the uncooperative student through written communication of the consequences of being fired and should deliver a sample of notification note to the teacher.

i) Set up group regulations as well as policies and anticipated standards. In the first team activity, make each group to create and sign a list of rules, regulations as well as anticipated standards. Ensure that each group mate signs the prepared list and give corrected versions to each group mates while the instructor retains one copy.

j) Maintain team size and other team characteristics for a period of four weeks. This is because it takes several weeks for a group to experience what may be considered as problem, and brainstorming to resolve the difficulty is a vital component of group work competency growth and advancement.

k) Make available self-evaluation of group progress and performance. Periodically after 2–4 weeks, ensure that groups react individually and collectively to questions concerning group performance, trainees participation rate, weaknesses in the group, group strengths as well as strategic areas that need improvement to enhance team performance.

l) Provide trainees the modalities for handling difficulties. Make it clear to group mates that identifying and tackling difficulties at an earlier stage could help prevent complicated problems in future and should go a long way to enhance group performance.

Conclusion/Summary

Preparing technology education students for the labour market and training them in the skills and competences that the industries want and need in their employees in the 21st century, does not happen by using traditional teaching methods. The traditional teaching methods were good for their purpose in the times of a very different labour market but today they create a gap between learning process and the needs of business. This calls for changes. Teachers need to modify the approach utilized for teaching and trainees need to modify learning approach. Cooperative learning has proved to be the best possible method to meet these needs of the 21st century labour market.

Based on the evidence or outcome from empirical studies and literature reviewed, one can conclusively say that, cooperative instruction is relevant in inculcating team work skills in students and also has the potentials of enhancing students' performance in various institutions. Since cooperative instruction helps in developing positive interaction ability in students, it is therefore needed for preparing technology education students and trainees for industry. For easy employment and effective performance of students in the industry, there is urgent need for technology education teachers and master trainers to adopt any of the cooperative instructional methods to inculcate in the trainees team work skills which are currently fundamental attributes needed by industrial employers during job selection exercise.

Evaluation/ Self-Assessment Exercises (SAEs)

1. Define cooperative instructional method?

2. Briefly justify the need for utilizing cooperative instructional method in technology education?

3. List and describe five elements of cooperative instructional method?

4. List four types of cooperative instruction?

5. Enumerate two theories guiding cooperative instructional method?

6. Outline five strategies for forming study groups or teams for effective instruction?

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