The Effects of Activity-Based Learning on Preventive Dentistry Classes in the Dental Hygiene Curriculum

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Objective: The study sought to discuss the effect of application of team-based activity-centered classes in the future’s dental hygiene education.

Methods: Experimental group was composed of 35 first-grade Class A students in 2019 at the Department of Dental Hygiene of ‘A’ College located at Gyeongsangbuk-do. While, comparison group was composed of 41 Class B students. Final study subjects were 76, excepting each one from the experimental group and from the comparison group, who didn’t take exams due to poor attendance.

Results: There was a significant difference (p < 0.05) in learning attitude according to academic achievement before and after learning attitude in the study attitude which is a subconcept of learning attitude in the subgroup.

Conclusion: Improvement plans for teaching methods suitable for dental hygiene subjects should be prepared, and programs developed through the development of new teaching-learning models. It is believed that this is necessary.

Keywords: activity-based learning, problem-based learning, team-based learning, community based learning

Introduction

Due to the change of paradigms in step with the ushering knowledge-based society in the 21st Century, main actors of education are changing from educators to learners, and diverse teaching methods which may induce direct participation of learners are being suggested as a method to enhance learning effect [1]. So, there is need to build learning environment whereby to improve positive learning attitude and internal motivation and allow learners to solve problems themselves by self-directed learning [2]. The medical field also diagnosed the problems of the existing curriculums and suggested improvement directions in order to establish and accomplish the objective and goal of education matching the 21st Century. And it is attempting to have a bold transformation into a new education system, by suggesting problem-focused learning application and evaluation methods, jumping from the stereotyped concept of lecture-centered learning. Lecture- and teacher-centered pedagogy, which has been traditionally used in classes of the departments of dental hygiene, can convey lots of contents in a short time to learners and be effective for summarizing the whole learning content [3]. On the other hand, it is a teaching-centered passive approach focused more on teaching than learning and as a result, it has shortcomings in acquiring self-learning ability as a professional in the area.
of new principles and technologies [4]. The objective of dental hygiene education is to systematically educate professional knowledge and technology needed for practical work as a dental hygienist at the actual clinical scenes [5]. The current curriculums at the departments of dental hygiene are dominated by exceedingly subdivided curriculums centered on preparation for state examinations set to assign qualification for a dental hygienist as well as theory-oriented lectures centered on medical expertise [6]. So, in reality, we see a certain lack of opportunities to develop original role and functions of dental hygiene education and there is insufficient research on development and adaption of new teaching-learning methods—one of alternatives to solve this problem. Under the circumstances, to change medical education at universities in step with the change of time may need self-directed practical teaching-learning methods to cultivate the ability to analyze and apply information, problem-solving ability, creativity [3]. For learners to develop into a self-directed learner needs motivation to learn themselves and they should be able to design learning plans themselves and cultivate communication ability using voluntary and small-group learning activities [7]. Bruner [8] defined learning motivation as a tendency of learning or the will to learn, and Choi [9] pointed out that to maintain the initial learning motivation of learners is one of important requirements to acquire learning objective. And learning motivation and self-directed learning ability were reported to be important factors in making learners experience positive and active learning by inviting them to learn themselves [10]. Of varied pedagogies to satisfy these factors, those that are expanding rapidly these days include collaborative learning models, such as problem-based learning (PBL), team-based learning, community-based learning [11]. Collaborative learning, which exerts a synergy by team activity and adds momentum to learning activity, is an appropriate method to motivate learners to learn themselves. This study, away from pedagogy that used to convey one-sided knowledge to learners via the existing lectures rather than discussing the current qualitative level of college students, opted for team-based activity learning method. This method allows learners to be interested in their own learning and enhance their desire to learn and let them enhance their learning motivation with responsibility for own learning and to cultivate self-directed learning ability. Team-based activity learning, which considers the basic structure of the organization as a team for leadership development, improvement of team skills, problem-solving ability, is a strategy to solve diverse problems occur within a team. It is a collaborative learning method in which team members carry out conceptual learning in a group. A team-based activity class also develops interpersonal relationship skills and solves diverse cases via sufficient advance learning, inducing self-directed classes and small-team discussions [11]. So, it can be an effective learning method for them to cultivate higher-level thinking ability. Therefore, the study applied team-based activity classes at some students from dental hygiene curriculums, compared them with lecture-based classes and analyzed the effect of team-based activity classes on learning motivation and self-directed learning ability. In doing so, the study sought to discuss the effect of application of team-based activity classes in the future’s dental hygiene education.

Materials and Methods

This study applied team-based activity learning to subjects of preventive dentistry practice, measured and analyzed the change of learner’s learning attitude and academic performances. And by this, the study sought to prepare measures to improve pedagogy in dental hygiene education and utilize them as basic materials for development of teaching-learning methods.

1. Methods

Experimental group was composed of 36 first-grade Class A students in 2019 at the department of dental hygiene of ‘A’ College located at Gyeongsangbuk-do. While, comparison group was composed of 42 Class B students. Final study subjects were 76, excepting each one from the experimental group was composed of 42 Class B students. Final study subjects were 76, excepting each one from the experimental group and from the comparison group, who didn’t take exams due to poor attendance. The subjects were composed of totally 76 (7 males, 69 females) both without clinical practice. Both groups underwent the same curriculum.

2. Study subjects

The period of data collection of this study was from the approved date for deliberation exemption until December 31. Following was the criteria of selecting the subjects.

① Students who completed education of preventive dentistry practice at the relevant terms.
② Those who understood the purpose of this study and consented to the study.
③ Those who could understand the content of the questionnaire and communicate.
④ Those who consented to the study after being briefed of personal information and confidentiality.

Following was the criteria of excepting the subjects.

① Those who couldn’t understand the background and purpose of the study which was explained by the researcher himself.
② Those who didn’t consent to personal information and...
confidentiality after being briefed of them.

3. Statistical analysis

The experimental group in this study conducted team-based activity classes from August 26, 2019 to December 6, 2019. While, the comparison group conducted lecture-centered classes from August 30, 2019 to December 2, 2019. All of the two groups were measured for change of learning attitude and academic performance levels before and after learning. The experimental group had the researcher as a tutor for team-based activity classes, and six teams composed of 5 to 6 persons carried out three phase learning of prior learning, test of preliminary tasks and team learning. All of the two groups had their learning attitude before and after learning measured. The study used scores of midterm exams and final exams as academic performance levels and surveyed satisfaction levels after learning. Learning attitude used the questionnaire at Hwang’s study by being requoted [15]. The questions were composed of totally 16 questions; self-concept, study attitude, learning habits–subconcept of learning attitude. Using a Likert scale, measurement was done with 1 point for Never, 2 points for generally Disagree, 3 points for Don’t know, 4 points for generally Agree and 5 points for Always so. The period of data collection was until December 30 from the approval for deliberation exemption (7003565-201912-HR-002-01) and collected data underwent analysis and statistical treatment using IBM SPSS ver. 24.0 window (IBM Corp., Armonk, NY, USA). The homogeneity test among the groups showed that there was no significant difference (p>0.05) as a result of pre-learning achievement and learning attitude questionnaire analysis (Table 1).

Results

1. Changes in learning attitudes before and after learning by group

In order to examine the influence of team-based activity class learners learning attitudes, the study group showed a significant difference (p<0.05) before and after the study group and the control group, showed no significant difference (Table 2).

2. Group academic achievement effect

The group academic achievement was 86.50 in the experimental group and 83.63 in the control group. The experimental group showed higher academic achievement than the control group and there was a significant difference (p<0.05) between the groups after team-based activity learning (Table 3).

Table 1. Group attitude and learning motivation verification

<table>
<thead>
<tr>
<th>Division</th>
<th>Experiment</th>
<th>Control</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning attitude</td>
<td>Self-concept</td>
<td>3.81±0.47</td>
<td>3.63±0.53</td>
<td>1.67</td>
</tr>
<tr>
<td></td>
<td>Study attitude</td>
<td>3.95±0.53</td>
<td>3.76±0.45</td>
<td>1.84</td>
</tr>
<tr>
<td></td>
<td>Learning habits</td>
<td>3.67±0.48</td>
<td>3.57±0.52</td>
<td>1.00</td>
</tr>
<tr>
<td>Learning motivation</td>
<td>Learning attitude</td>
<td>3.82±0.45</td>
<td>3.66±0.39</td>
<td>1.87</td>
</tr>
<tr>
<td></td>
<td>Attention</td>
<td>3.52±0.60</td>
<td>3.51±0.42</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Relevance</td>
<td>3.63±0.71</td>
<td>3.75±0.52</td>
<td>-0.91</td>
</tr>
<tr>
<td></td>
<td>Confidence</td>
<td>3.23±0.52</td>
<td>3.32±0.37</td>
<td>-1.02</td>
</tr>
<tr>
<td></td>
<td>Satisfaction</td>
<td>3.31±0.67</td>
<td>3.54±0.42</td>
<td>-1.80</td>
</tr>
<tr>
<td></td>
<td>Learning motivation</td>
<td>3.43±0.60</td>
<td>3.54±0.35</td>
<td>-1.06</td>
</tr>
</tbody>
</table>

Values are presented as mean±standard deviation. T-test.

Table 2. Differences in learning attitudes before and after learning by group

<table>
<thead>
<tr>
<th>Division</th>
<th>Experiment</th>
<th>Control</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td></td>
<td>Before</td>
</tr>
<tr>
<td>Self-concept</td>
<td>3.81±0.47</td>
<td>4.07±0.55</td>
<td>3.21*</td>
<td>3.63±0.56</td>
</tr>
<tr>
<td>Study attitude</td>
<td>3.95±0.53</td>
<td>4.24±0.44</td>
<td>3.54*</td>
<td>3.76±0.45</td>
</tr>
<tr>
<td>Learning habits</td>
<td>3.67±0.48</td>
<td>3.88±0.50</td>
<td>2.51*</td>
<td>3.57±0.52</td>
</tr>
<tr>
<td>Learning attitude</td>
<td>3.82±0.45</td>
<td>4.07±0.44</td>
<td>3.69*</td>
<td>3.66±0.39</td>
</tr>
</tbody>
</table>

Values are presented as mean±standard deviation. Paired T-test, *p<0.05.
3. Differences in learning attitude according to academic achievement of experimental group

The experimental group was divided into upper and lower groups according to the level of academic achievement and the learning attitude according to academic achievement showed no difference between the upper group and the lower group and it was found that there was a significant difference (p<0.05) between the study attitude and the learning attitude in the subgroup before and after the learning attitude (Table 4).

4. Group academic achievement effect

The class satisfaction was 4.52 in the experimental group, 3.80 in the control group indicating high class satisfaction in the experimental group and there was a statistically significant difference (p<0.05) (Table 5).

5. Class satisfaction according to academic achievement of experiment group

The class satisfaction according to the academic achievement of the experimental group was 4.53 for the upper group and 4.51 for the lower group. The higher group students showed higher class satisfaction than the lower group students, but there was no statistically significant difference (Table 6).

Table 4. Differences in learning attitudes according to academic achievement

<table>
<thead>
<tr>
<th>Division</th>
<th>Experiment Before</th>
<th>Experiment After</th>
<th>Control Before</th>
<th>Control After</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-concept</td>
<td>3.86±0.48</td>
<td>4.05±0.52</td>
<td>3.75±0.47</td>
<td>4.00±0.51</td>
<td>−1.64</td>
</tr>
<tr>
<td>Study attitude</td>
<td>4.09±0.45</td>
<td>4.27±0.45</td>
<td>3.77±0.57</td>
<td>4.21±0.49</td>
<td>−1.61</td>
</tr>
<tr>
<td>Learning habits</td>
<td>3.75±0.44</td>
<td>3.84±0.54</td>
<td>3.54±0.53</td>
<td>3.80±0.56</td>
<td>−1.54</td>
</tr>
<tr>
<td>Learning attitude</td>
<td>3.91±0.40</td>
<td>4.09±0.43</td>
<td>3.70±0.49</td>
<td>4.05±0.40</td>
<td>−1.92</td>
</tr>
</tbody>
</table>

Values are presented as mean±standard deviation. Paired T-test, *p<0.05.

Table 5. Group academic achievement effect

<table>
<thead>
<tr>
<th>Division</th>
<th>Experiment</th>
<th>Control</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic achievement</td>
<td>4.52±0.40</td>
<td>3.80±0.95</td>
<td>4.35*</td>
</tr>
</tbody>
</table>

Values are presented as mean±standard deviation. T-test, *p<0.05.

Table 6. Class satisfaction according to academic achievement

<table>
<thead>
<tr>
<th>Division</th>
<th>Experiment</th>
<th>Control</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic achievement</td>
<td>4.53±0.36</td>
<td>4.52±1.05</td>
<td>0.17*</td>
</tr>
</tbody>
</table>

Values are presented as mean±standard deviation. T-test, *p<0.05.

Discussion

To achieve effective learning assumedly needs not only students’ efforts but building of learning environment and effective teaching methods in which educators could be a facilitator for students to learn themselves and students could form related knowledge or concepts in a self-directed way [12]. This study, shaking away from the existing pedagogy that used to convey general knowledge to learners through lecture-centered learning, applied team-based activity classes so that they, interested in their own learning, could boost their desire to learn with responsibility for own learning in a self-directed way. And then the study verified its effects and aimed at suggesting directions for dental hygiene education. Educational direction for cultivating practical dental hygienists at the actual field as needed by the dentistry industry desperately requires education that may enhance practising strength to positively cope with varied dentistry situations, and efficient learning as well as education of cultivating problem-solving ability. Important factors for the boost of the efficiency of learning were reported to be learning attitude and learning motivation [13]. Yang and Seo [14] analyzed and reported the awareness level of educational content depending on academic performance levels during preventive dentistry practice.

And as a matter of fact, still lacking is the research on teaching-learning methods in connection with pedagogy of dental hygiene. Thus, the author, applying activity-centered classes to the subjects of preventive dentistry practice, measured and analyzed the change of learner’s learning attitude and academic-
ic performance levels. And by this, the study sought to prepare measures to improve pedagogy in dental hygiene education and utilize them as basic materials for development of teaching-learning methods. Team-based activity classes turned out to be more effective in positively improving learning attitude and academic performance levels compared with lecture-centered classes. In team-based activity classes, the students were supposed to achieve common targets using the strategy of team-based activity classes and share the vision and interact themselves for an efficient communication system on the path towards acquiring the educational results. For this reason, we need measures to improve pedagogy suiting to the subjects of dental hygiene as well as program development by exploring new teaching-learning models. As a result of the analysis, there was a significant difference of major effects between before and after learning. And the experimental group saw the betterment in all areas of attention, relevance, confidence and satisfaction–subconcept of learning motivation–before and after the learning, with satisfaction area achieving the highest betterment. Even lecture-centered learning could show change in learning motivation, and yet the change of learning motivation in the experimental group turned out higher than that in the comparison group, telling us team-based learning could more influence the positive change of learning motivation. Hwang [15] reported that problem based learning was effective in enhancing learning motivation, based on the result of measuring the learning motivation after applying the PBL in which the group of PBL marked 90.6 points, while group of lecture-centered learning marked 81.3 points. Compared with Hwang’s study [15], there was some differences in applied teaching-learning methods. However, from the positive standpoint of pedagogy in which learners learned themselves via small group discussion, it was considered to corroborate the findings of this study. Learning motivation was measured based on ARCS theory [16], and Bohlin and Milheim [17] suggested learning motivation were to be used as basic material to determine the demand of adult learner’s motivation. Learning motivation, which is a base to determine the conceptual elements of attention, relevance, confidence and satisfaction, is one of the most difficult elements to deal with while establishing lecture plans and proceeding the lecture. Under a given class circumstance, educators should establish strategies after grasping learning attitude of students and what they want, how much they render their efforts to solve what they need for learning as well as how much they are pleased with their learning achievements. And so, their motivation or value may affect their attention to learning tasks, and their effort level along with their expectations [18]. Choi [9] reported that self-esteem and learning motivation of high school students had very close positive correlation in general and overall self-elements of learning had mutually positive educational impacts themselves along with learning motivation. Kang [19] reported that should confidence, interest and attention of students be shown differently due to their gender variable, what is desperately needed is to draw confidence in learning and intellectual curiosity of students with poor academic performance at the current school classroom environment led by those with good academic performance. Viewed from this aspect, team-based activity classes were considered enough to draw learner’s learning motivation. Learners could overcome the tediousness of learning and get interested in collaborative learning while learning themselves according to the previously suggested learning targets, search data and get information to complete learning task and consequently experiencing interest in learning and curiosity. This can take place also when during team discussions, they exchange information with others and infer, discuss what was learned. In other words, team-based activity classes might continuously provide opportunities for learners to get interested in learning, arouse curiosity and have learning motivation, and so we may need to develop collaborative learning models suiting to the level of learners. In the survey of the effect of team-based activity classes on self-directed learning ability of learners, only attachment to learning, openness for challenge, curiosity in learning, taking responsibility for learning showed significant differences between the groups. In team-based activity classes, the concept of taking responsibility for learning marked the highest score with 4.07 points, while in lecture-based classes, the concept of self-understanding marked the highest with 3.68. Average self-directed learning ability by the group marked 4.07 points at the experimental group and 3.70 at the comparison group, showing a significant difference between the groups. Self-directed learning ability is defined as “a process in which individuals take the initiative in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes” [20]. Self-directed learning is a concept that is more actively studied in adult education. Team-based activity classes in this study, along with PBL, provided self-directed learning environment, enabling the learners to attend the classes with responsibility and ownership for problems while solving problems using plenty of discussions and diverse methods. Choi [21] reported that collaborative learning could enhance self-directed learning ability and make learners to have ownership for learning by demanding them to have positive participation during learning process. Web-based PBL was also more effective in the boost of self-directed
learning ability compared with traditional teacher-centered classes [22]. Team-based activity classes were believed to provide self-directed learning ability in accordance with the development of learners’ attachment to learning and exploration ability while learning themselves following learning targets previously suggested and searching the needed data. And learner-centered flexible learning activity was likely to bring about the positive change of learning attitude. Han [10] also reported that self-directed learning ability of adult learners showed a significant difference depending on age and academic background, and succeeding studies might be needed on research considering age and school grade. Hyeon and Park’s study [23], suggesting an integrated learning model to improve learners’ self-directed learning ability, proposed the role of educators to guide and facilitate their activity and motivate them. Team-based activity classes highly encourage least theory instruction, and team discussion. That said, very rare is research that defined the role of a tutor in detail and the study believes research on that area should be conducted.

The most difficult and important element in initiating a team learning is allegedly a firm belief in the its process [24]. Should educators develop and apply learning methods suitable to learners with firm belief in learning, it would lay the groundwork for effective and efficient learning. As the limit of this study, its findings, drawn from students from the department of dental hygiene at a university, would hardly be considered to generalize the outcomes of team-based activity classes in the normal departments of dental hygiene. So, succeeding research needs to have comparative research with other university students. Also, the timing of survey for the experimental group and comparison group was different and its findings may be different with that made at the same time. So, future study needs to verify the measurement result from the same time.

Conclusion

A total of 35 students from Class A in the department of dental hygiene at ‘A’ College in Gyeongsangbuk-do were comprised of an experimental group 35 and a group of 41 students in Class B. The subjects of this study were 7 males and 69 females (76 females) with no clinical practice. Both groups operated the same curriculum and obtained the following results.

1. After learning about the learning attitude of the experimental group and the comparative group, the experimental group showed a significant difference before and after learning, and the comparison group showed no significant difference (p<0.05).

2. The group’s academic achievement was 86.41 points for the experimental group and 83.54 points for the comparative group, and the actual group showed higher academic achievement than the comparative group, which showed a significant difference between the groups after the team-based activity-based learning (p<0.05).

3. As a result of examining the learning attitude according to academic achievement, there was no difference between the upper group and the subgroup, and there was a significant difference between the learning attitude, which is a subconcept of the learning attitude, in the subgroup before and after the learning attitude (p<0.05).

4. The class satisfaction was 4.43 points for the experimental group and 3.71 points for the comparative group (p<0.05).

In the above, team-based activity class strategy achieves common goals, team-based activity class that achieves results by interacting with the members by sharing the vision and establishing an effective communication system, and more effective in positively improving academic performance.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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References


