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Applying the Elements of Cooperative Learning: Reported Influence on Self-directed Learning and View of Cooperative Learning

Betty Breed

North-West University, Potchefstroom, South Africa, 2531

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ABSTRACT This research explored the influence of incorporation of the five elements of effective cooperative learning on students' views of cooperative learning and their level of self-directed learning (SDL). A class group consisting of seven second-year Information Technology education students was involved. Both quantitative and qualitative data were collected. A questionnaire was used to determine the students' levels of self-directed learning in a pre-test and a post-test, while individual feedback and open-ended questions were used to determine their views of cooperative learning. The students' views and experiences regarding incorporation of the five elements of effective cooperative learning are reported and discussed, as well as changes in their self-rated level of self-directed learning. The results show that structuring of cooperative learning activities to include the five elements changed students' views of group work, and at the same time enhanced their level of self-directed learning in the areas of use of appropriate learning strategies, evaluation of own learning, and interpersonal skills.

INTRODUCTION

Social constructionism posits that almost everyone learns in collaboration or cooperation with others (Peters and Gray 2005). Peters and Gray (2005) therefore suggest a model of teaching and learning for self-directed learning (SDL) that includes collaborative or cooperative learning. The importance of the collaborative or cooperative component of SDL has been emphasised by scholars such as Brockett, Guglielmino, Hiemstra, and Long, who have contributed significantly to research in SDL (Donaghy 2005). Cooperative learning, as viewed in this paper, entails working together in a small group to accomplish shared goals, and to maximise the learning of each individual group member (Johnson and Johnson 2013; Khan et al. 2015).

For cooperative learning to be effective and successful, some basic elements have to be incorporated into each cooperative learning activity (Johnson et al. 2007). The five basic elements of effective cooperative learning, according to Johnson and Johnson (2009), are positive interdependence, individual accountability, promotive face-to-face interaction, appropriate social skills, and group processing. Research has shown that inclusion of these basic elements in group activities enhances the academic and social achievement of college and university students (McWhaw et al. 2003).

Address for correspondence:
Betty Breed
Faculty of Education Sciences, North-West University, Private Bag X6001, Potchefstroom, South Africa, 2531
Telephone: +27 18 299 1475
Fax: +2718 299 4238
E-mail: betty.breed@nwu.ac.za

Objectives of the Research

This research aimed to examine the self-rated level of SDL and the views of cooperative learning of second-year Information Technology education students before and after applying Johnson and Johnson's (2009) five basic elements of cooperative learning.

Self-directed Learning and Cooperative Learning

According to Long and Agyekum (1984: 709), "[t]he complexity of life and the increasing importance of learning across the lifespan put an added emphasis on self-direction in learning". Currently, 30 years after Long and Agyekum made this statement, the emphasis on self-direction in learning has become more acute, given the development of technology, and the exponential increase in information generation. Yet, in South Africa the education system in schools is still what Williams (2001: 89) described as "largely teacher-directed, fact-orientated and

lack[ing] inclusion of activities designed to facilitate the development of SDL abilities".

In higher education, however, concerns have grown about delivering graduates who have the ability to engage in SDL, and who are prepared to commit to lifelong independent learning (Raidal and Volet 2009), particularly students in professional degree courses. Self-directed, lifelong learners view learning as a personal responsibility, engage in challenging problems, and display an eagerness to learn (Ayyildiz and Tarhan 2015). The concerns thus make it necessary for lecturers within formal learning contexts to find and apply strategies to foster development of the skills and attitudes needed to move towards SDL (Guglielmino 2013). One of the strategies that holds promise in terms of SDL is cooperative learning.

In 2009, development of self-directed students was accepted as a strategic priority by the Faculty of Education Sciences at North-West University in South Africa, which is known for its professional teacher-training programmes. To infuse the notion of SDL into the programmes, it was necessary that a grounded conceptualisation of SDL be presented. The Self-Directed Learning Research Focus Area in the faculty started out with a conceptualisation of SDL, based on an extensive literature review, and using as point of departure Knowles' (1975) definition of SDL and Guglielmino's (1978) description of a highly self-directed learner. For the purposes of this research, only the characteristics of a self-directed learner, and related psychological aspects, have been excerpted in Table 1.

Development of self-direction in learning can be promoted by the use of social learning activities (Vermunt and Verschaffel 2000). The active and student-centred nature of cooperative learning as a teaching and learning strategy makes it highly suitable for promoting SDL. A meta-analysis by Johnson et al. (2000) of studies on cooperative learning, conducted from elementary level to post-secondary level, shows that use of the

Table 1: Aspects related to self-directed learning

	Characteristics of a self-directed learner
Ownership of Learning	• Takes initiative and responsibility for own learning (Knowles 1975) • Identifies own learning needs (Knowles 1975) • Formulates own learning goals (Knowles 1975)
Extension of Own Learning	• Implements learning strategies effectively (Knowles 1975) • Applies subject knowledge independently (Straka 1995) • Applies learning in new contexts (Hiemstra 1994) • Learns beyond the curriculum (Hmelo-Silver 2004) • Applies self-assessment techniques (Wang 2013) • Demonstrates competence in knowledge and skills of the task (Bolhuis 2003)
Management of Own Learning	• Chooses appropriate learning strategies (Knowles 1975) • Formulates questions and generates own inquiries (Guglielmino 1978) • Identifies appropriate learning resources (Knowles 1975) • Uses feedback in order to self-adjust (Wang 2013) • Translates learning needs into learning objectives (Knowles 1975)
Interpersonal Skills	• Communicates effectively, both interpersonally and intrapersonally (Williamson 2007) • Collaborates effectively (Knowles 1975)
	Psychological aspects
Self-Regulation and Metacognition	• Demonstrates openness and awareness of own learning (Blumberg 2008) • Plans own learning and sets goals (Guglielmino 1978) • Reflects on own learning (Guglielmino 1978) • Monitors own learning (Guglielmino 1978) • Evaluates own learning (Knowles 1975)
Motivation	• Demonstrates intrinsic motivation (Hsu and Shiue 2005) • Demonstrates goal orientation (Guglielmino 1978) • Demonstrates a need to know (Straka 1995) • Demonstrates willingness to direct own learning (Fisher et al. 2001) • Demonstrates volition (Garrison 1997) • Demonstrates curiosity, independence, persistence, responsibility, and self-discipline (Guglielmino 1978; Knowles 1975; Patterson et al. 2002) • Demonstrates self-efficacy (Guglielmino 1978)

cooperative learning methods investigated resulted in higher academic achievement of students at all levels. Other benefits that research on cooperative learning has discovered are enhanced critical thinking skills (Cockrell et al. 2000), better transfer of learning (Brandon and Hollingshead 1999), development of social skills, such as communication, presentation, problem solving, leadership, delegation, and organisation (Cheng and Warren 2000), and more learning satisfaction (Tadesse and Gillies 2015). Further research with post-secondary students has found that structuring the basic elements of cooperative learning into students' group work has led to enhanced achievement, both socially and academically (McWhaw et al. 2003). It has been argued that working cooperatively in groups without applying these basic elements will most likely lead to non-effective learning in the group (Mentz et al. 2008). Simply dividing students into groups to work together does not mean that effective learning will occur (Khan et al. 2015).

The five basic elements generally acknowledged as being essential for effective cooperative learning are those proposed by Johnson and Johnson (2009), namely positive interdependence, individual accountability, promotive face-to-face interaction, appropriate social skills, and group processing. *Positive interdependence* exists when individuals perceive that they cannot succeed unless every other member of the group succeeds (Johnson and Johnson 2013). The success of the group is thus contingent on the success of each individual member of the group (Johnson and Johnson 2009). In an effective group, every member has two responsibilities, namely to maximise their own productivity, and to maximise the productivity of all other members of the group (Johnson and Johnson 2013).

The degree of positive interdependence in the group influences the group's perception that it is operating as an entity. Johnson and Johnson (2013) refer to this perception as *entitativity*: the stronger the interdependence (common goals, common outcomes, interpersonal bonds, promotive interaction, and communication), the greater the perception that the group is operating as an entity. In turn, entitativity influences group members' identification with the group, social identity, feelings of self-esteem and self-worth, empathy for other members, and support in the group (Johnson and Johnson 2013).

Positive interdependence can be enhanced through structuring of group goals to ensure cooperation of all members in the group (Veenman et al. 2002), structuring of reward systems to ensure that the efforts of all members are necessary to reach the goals of the group (Veenman et al. 2002), and structuring of the roles of members of the group. Formulation of own learning goals, and translation of learning needs into learning objectives, even in a group, allows students to take ownership of and manage their own learning, thus contributing to development of self-direction in learning.

Closely related to positive interdependence is the element of *individual accountability*: individual responsibility to successfully complete one's own share of the group activity, whether it is construction of knowledge, researching of information, or creation of a product (solving a problem) (McWhah et al. 2003). Incorporation of individual accountability in cooperative learning activities addresses the apprehensiveness that students often have about group work, and lays a foundation for meaningful interaction between students (Tadesse and Gillies 2015). Based on their own personal experiences with learning in groups, students may be concerned about other group members not pulling their weight, or wasting their learning time (McWhaw et al. 2003).

According to Mentz et al. (2008), development of individual accountability can be achieved through assessment of the work of individual students within the group effort, providing feedback on individual performance to the entire group, which ensures that group members keep each other accountable, individual assessment, and demanding random report-backs from students on the group activity. The requirement that students assume specific responsibilities during cooperative learning may thus contribute to promotion of SDL.

Effective cooperative learning is also dependent on appropriate social interaction. *Promotive face-to-face interaction* occurs when members of a group encourage and facilitate each other's efforts to achieve the goals set for the group activity (Johnson and Johnson 2013). Face-to-face interaction becomes promotive when students are engaged in explanations of their learning processes, or are sharing their knowledge with other members, exchanging resources, challenging one another's reasoning, and acting in trusting and trustworthy ways (Johnson and Johnson 2013).

Promotive interaction requires development of *appropriate social skills* and an understand-

ing of group dynamics. To be effective in a cooperative learning activity, members of a group need to display the skills of active listening, conflict management, good communication, leadership, decision making, and trust building. Development of students' abilities to collaborate effectively with other members of the group, as well as to communicate effectively, may thus also contribute to students' resources for self-direction in learning.

The fifth of Johnson and Johnson's (2009) basic elements of cooperative learning is group processing. *Group processing* entails the group's self-evaluation of group members' cooperation, and how well they have achieved their goals (Johnson and Johnson 2009). Evaluation of the cooperative learning activity encourages group members to apply metacognitive skills in the learning process, and it promotes a sense of self-efficacy (Johnson and Johnson 2013). It also provides an opportunity for the group to celebrate its successes. Application of self-assessment techniques and self-reflection to evaluate the group's learning and degree of cooperation at the same time develops some of the psychological aspects involved in SDL.

Incorporation of these basic elements of effective cooperative learning needs to be done over an extended period of time. For group learning to be successful, it is necessary to train students, and then to give them sufficient time to exercise the processes related to the elements, while they are monitored (Oliver and Omari 2001). Once-off training may not ensure successful cooperative learning; cooperative learning should rather be a scaffolded process which is monitored over a longer period of time (McWhaw et al. 2003).

The purpose of this research was to examine the self-rated level of SDL of second-year Information Technology education students before and after applying Johnson and Johnson's (2009) five basic elements of effective cooperative learning. The research further examined the students' views on cooperative learning as a teaching and learning strategy before and after applying the five elements.

METHODOLOGY

Intervention

The intervention started with a discussion with the participants and a modelling of the five basic elements essential for effective cooperative learning. This was done to inform participants about the purpose of incorporating these elements into cooperative learning activities. It was also done to prepare them for their own application of each of the five elements in the cooperative learning activities which they would participate in in the few weeks to follow. In the subsequent cooperative learning tasks that the students completed, the elements were introduced, one or two at a time, until the participants' cooperative learning sessions completely incorporated all five basic elements. Every time after one or two of the five elements were introduced, the students had to report back on their experiences in incorporating that particular element or those particular elements into their cooperative learning tasks. The students were not informed that their level of SDL was also being investigated. This was done to ensure that the students' reporting was not influenced.

Sampling

The research involved a class group of seven students who were in their second year of undergraduate training as Information Technology teachers. The author was responsible for the teaching and learning of the module. The specific module had both theoretical and practical components on networking and web page development. Five of the participants were female, and two were male. Six of the participants were in the age group 19-20 years, while one participant was in her early 30s. The group included participants from different race groups, and each of the participants had full command of the language of teaching and learning. Some of the students had had experience with group work before, but not with an approach that carefully addressed the elements of effective cooperative learning.

Data Collection and Research Instruments

Williamson's (2007) Self-Rating Scale of Self-Directed Learning (SRSSDL)

The Self-Rating Scale of Self-Directed Learning (SRSSDL) is a questionnaire that was developed as a self-rating scale of one's level of SDL, specifically in higher education (Williamson 2007). The questionnaire is intended to assess SDL behaviour, indicating the level of self-directedness in learning. The questionnaire consists of 60 items, which are categorised into five

broad areas of SDL: *awareness* (of factors contributing to becoming a self-directed learner), *learning strategies* (which need to be adopted to become self-directed in learning), *learning activities* (which one needs to engage in to become self-directed in learning), *evaluation* (which is needed to monitor own learning), and *interpersonal skills* (which are a prerequisite to becoming a self-directed learner) (Williamson 2007). Construct validity was established, and the reliability of the questionnaire and that of the five broad areas was determined through acceptable Cronbach's alpha coefficient values (Williamson 2007).

Feedback on Incorporation of (a) Specific Element(s)

Every time after one or two of the five basic elements of effective cooperative learning was introduced into their cooperative learning activities, the participants had to reflect on and give individual feedback on their experiences. Their responses were based on the instruction *"Describe how you experienced the cooperative learning task that you have just completed, specifically attending to [the element(s)]"*.

Open-ended Questions

At the end of the intervention period, the participants completed two open-ended questions about incorporation of the five basic elements of effective cooperative learning into group work. The aim of these questions was to determine participants' overall experiences and views regarding application of these elements, and how the elements influenced participants' perceptions of cooperative learning. The two instructions that participants had to respond to were *"Please describe your experience of the group work that was done in this class. Motivate your experiences by referring to specific examples"* and *"Give your opinion on the extent to which your knowledge of the elements of cooperative learning (positive interdependence, individual accountability, promotive face-to-face interaction, interpersonal skills, and group processing) influenced your experience of the group work in this class"*.

At the beginning of the semester, the participants completed the SRSSDL. The first cooperative learning activity that the participants had to complete in this module was done without them being provided with any guidelines on how to structure an effective cooperative learning activity.

The intervention was then implemented for the following 10 weeks. After one or two of the five basic elements of effective cooperative learning were incorporated into at least two of the participants' cooperative learning activities, the participants gave individual feedback on their experiences regarding the specific element(s). The first discussion and demonstration was on the elements of *appropriate social skills* and *promotive face-to-face interaction*. The participants were then expected to incorporate these two elements into two of their subsequent cooperative learning activities, after which they gave individual feedback on their experiences regarding these specific elements. This was followed by a discussion of *positive interdependence* and *individual accountability*. Participants were again expected to incorporate these two elements into two of their subsequent cooperative learning activities, after which they again gave individual feedback on their experiences regarding these specific elements. Lastly, the element of *group processing* was discussed, it was incorporated into the subsequent two cooperative learning activities, and it was reported on.

At the end of the semester, the participants again completed the SRSSDL, as well as a set of open-ended questions which enquired about the participants' overall views and experiences regarding incorporation of the five basic elements essential for effective cooperative learning into their group work.

Data Analysis

Statistical analysis could not be conducted on the questionnaire responses, due to the small size of the sample. The two SRSSDLs, which each participant had completed at the beginning and at the end of the semester, respectively, were scored individually, to allow for comparison of the self-rated levels of SDL of each participant. The data were managed on a spreadsheet covering the five broad areas of SDL, to reflect the participants' self-rating of their levels of SDL in each area.

The data derived from the participants' individual feedback after each of the five basic ele-

ments of effective cooperative learning were incorporated into their cooperative learning activities were transcribed and analysed using Atlas.ti™, where the relevant principles of qualitative data analysis were applied. The transcripts were coded into themes and subthemes, and then analysed for themes that appeared dominant. The aim of this analysis was to gain an impression of the participants' views and experiences regarding incorporating each of the five basic elements of effective cooperative learning into their cooperative learning activities. Special attention was given to identifying links between the participants' responses and aspects of SDL. The data from the open-ended questions were coded using a combination of a priori and other emerging codes. The a priori codes used were *initial view of cooperative learning*, *views on incorporation of basic elements*, and *view of cooperative learning afterwards*. Again, links between the responses and aspects of SDL were identified. Other emerging codes were allowed, in order to gain a more in-depth understanding of the participants' views and experiences. The validity of the analysis of the qualitative data in this research was established by having the transcripts, the coding, and the translation cross-checked by another expert in the field of research, who was not involved in the current research.

RESULTS

Williamson's (2007) Self-Rating Scale of Self-Directed Learning (SRSSDL)

Responses to the 60 items of the SRSSDL were rated on a five-point scale, with possible response options ranging from 1 to 5, where 1 represented "never", and 5 represented "always". Each of the five broad areas of SDL, as categorised by Williamson (2007), included 12 items. Table 2 reflects the results in the five broad areas of SDL, as the participants rated themselves at the beginning (B) and at the end (E) of the semester, respectively. The following scoring range and associated levels of SDL were used to indicate the participants' self-rated level of SDL: 60-140 represented a low (L) level of SDL, 141-220 represented a moderate (M) level, and 221-300 represented a high (H) level (Williamson 2007). Instances where there was an increase of six or more points in the post-test are shaded.

Table 2 reveals a definite trend towards increased levels of SDL in the 10 weeks between administration of the pre-test and administration of the post-test. Despite the fact that five of the seven students at the beginning of the semester rated their level of SDL in the "high" category, while the other two rated themselves in the "moderate" category, six of the seven students indicated an increase at the end of the semester. Student 6, who rated herself relatively high at the beginning of the semester, scored a similar rating at the end of the semester. Table 2 also reveals that not all of the students benefited equally in each of the five areas. The areas in which most students seem to have improved were *learning strategies*, *evaluation*, and *interpersonal skills*. Table 2 further shows a general increase, on average, for all of the five broad areas of SDL.

Feedback on Incorporation of the Five Basic Elements of Effective Cooperative Learning

Feedback from the participants' experiences related mostly to incorporation of the five basic elements of effective cooperative learning into their cooperative learning activities, with not

Table 2: Participants' self-rated level of self-directed learning

	Student 1		*Student 2*		*Student 3*		*Student 4*		*Student 5*		*Student 6*		*Student 7*		*Average*	
	B	*E*	*B*	*E*	*B*	*E*	*B*	*E*	*B*	*E*	*B*	*E*	*B*	*E*	*B*	*E*
Awareness	48	51	44	49	48	48	49	52	39	50	52	53	55	59	47.9	51.7
Learning strategies	40	48	39	45	43	48	39	46	39	42	52	52	51	56	43.3	48.1
Learning activities	44	46	35	47	48	47	43	48	39	40	53	53	53	59	45.0	48.6
Evaluation	44	52	41	46	51	49	45	49	33	39	55	54	48	60	45.3	49.9
Interper-sonal skills	47	54	46	50	47	55	45	44	47	51	58	56	49	59	48.2	52.7
Total:	223	251	205	237	237	247	221	239	197	222	270	268	256	293	230	251
Level of SDL	H	H	M	H	H	H	H	H	M	H	H	H	H	H		

much explicit reference being made to SDL. However, possible links between the responses and aspects of SDL (as summarised in Table 1) were identified, which were then categorised into Williamson's (2007) five broad areas of SDL. This was done to determine whether the qualitative results confirm the quantitative results.

In the following sections, the feedback is reported on in the same order in which the five basic elements were incorporated.

Appropriate Social Skills and Promotive Face-to-Face Interaction

The participants were clear about their recognition of the importance of appropriate social skills, such as active listening, good communication, and management of differences. They also recognised that contribution by every member of the group is important for the group to be successful, that group members can learn from one another, and that challenging one another's reasoning can improve one's learning as shown on Table 3. Linking their responses to SDL indicates that development of social skills and face-to-face interaction during cooperative learning may promote SDL, mainly in terms of e*ffective collaboration with peers* and *effective communication*. Other aspects of SDL that were mentioned were *use of feedback in order to self-adjust, taking initiative and accepting responsibility*, and *identifying appropriate learning resources* (see Table 3). Categorisation of these aspects into Williamson's (2007) broad areas of SDL shows development in the areas of *awareness* and *evaluation*, and particularly *interpersonal skills*.

Positive Interdependence and Individual Accountability

In general, the participants acknowledged the fact that each member of the group had to participate in the group activities, and had a contribution to make. However, it was not clear from the responses that participants had experienced that the success of the group is contingent on the success of each individual member. It was also not clear that participants had accepted responsibility for one another's learning. What was clear, however, was that participants had accepted responsibility for their own share of work in the activity as shown on Table 4. Identification of the links between the students' responses to questions about promoting positive interdependence and individual accountability during cooperative learning tasks may enhance the self-directed learning characteristics of *self-reflection*, *self-assessment*, *evaluation of own learning*, and *effective collaboration with peers* (see Table 4). Categorisation of these aspects into Williamson's (2007) broad areas of SDL indicates development in the area of *evaluation*, and also in the area of *interpersonal skills*.

Group Processing

The participants demonstrated openness in evaluating their own cooperation in their groups. Most of them were quite positive about their

Table 3: Responses after incorporation of social skills and face-to-face interaction

Responses with regard to cooperative learning	*Links to SDL*
This time I think we worked well together in the group. I was more patient and I am learning to listen to them.	*Effective collaboration with peers* *Self-reflection* *Effective communication*
We worked well together; we could sort out matters and listen to each other. We could agree after reasoning about matters.	*Effective collaboration with peers* *Effective communication*
I could help and also make some input. The group was successful, because we could discuss matters on which we differed. Sometimes they see something that you did not notice.	*Effective collaboration with peers* *Use feedback in order to self-adjust*
I helped to search for information; I gave my opinion and said when I differed from somebody else. Then we consulted more resources and talked about it.	*Take initiative and accept responsibility* *Identify appropriate learning resources*
I made a good summary and explained the work well to the other group members. I even draw a picture to explain a difficult concept.	*Effective collaboration with peers* *Implement learning strategies effectively*

Table 4: Responses after incorporation of positive interdependence and individual accountability

Responses with regard to cooperative learning	*Links to SDL*
This time I think we worked well together in the group and everybody participated and contributed equally.	*Effective collaboration with peers*
My contribution was good. I helped to do the activity and also made an input.	*Self-reflection;self-assessment*
I can contribute to the reasoning and provide valuable answers.	*Self-reflection; self-assessment*
I made a good summary and explained the work well to the other group members. I even draw a picture to explain a difficult concept.	*Self-reflection; self-assessment* *Evaluate own learning*

cooperation in their groups, and it seemed that those participants that initially struggled to participate were eventually comfortable enough to contribute to the activities in the group as sown on Table 5. The aspects of SDL that would seem to be most influenced by group processing are *self-reflection, self-assessment, self-efficacy,* and *awareness of own learning* (see Table 5). These aspects of SDL relate mainly to Williamson's (2007) area of *evaluation,* but also to the area of *awareness*.

Open-ended Questions

Initial View of Cooperative Learning

Two of the participants clearly voiced their initial views and feelings about group work. It would seem that they initially had negative feelings regarding group work, or they found it difficult to cooperate with other members of the group, as the following responses illustrate:

"At the beginning of the semester I was still antagonistic about group work."

"The first time with group work it was difficult for me not to take over and do everything myself."

Views on Incorporation of the Basic Elements of Effective Cooperative Learning

Most of the responses of the participants pertained to accepting responsibility for their own learning, and the role of appropriate communication skills. Only two participants mentioned accepting responsibility for the learning of other members of the group. This is probably a foreign notion for most students. It would seem that some of the participants found the self-evaluation and the group evaluation valuable, as individuals gave responses related to being influenced positively, being aware of their own learning, and implementing cooperative learning as a teaching and learning strategy as shown on Table 6. The most important links identified between the responses and aspects of SDL related to *accepting responsibility for own learning, effective communication, evaluation of own learning*, *motivation*, *implementing learning strategies effectively*, and being able to *apply learning in new contexts* (see Table 6). These aspects of SDL can be categorised into four of Williamson's (2007) five broad areas, namely *awareness*, *interpersonal skills*, *evaluation*, and *learning strategies*.

View of Cooperative Learning Afterwards

From the responses, it would seem that, in general, the participants' view of cooperative learning was influenced positively, although for different reasons, and in different areas. The reasons given include the knowledge that each

Table 5: Responses after incorporation of group processing

Responses with regard to cooperative learning	*Links to SDL*
I think this time I worked well with the group; everybody participated and contributed to achieving the goals.	*Self-reflection; self-assessment* *Effective collaboration with peers*
I can contribute to the reasoning and provide valuable answers.	*Self-reflection; self-efficacy*
I did my best and made a good summary. Everybody understood what I explained, and nobody had any questions.	*Self-efficacy*
Initially I was a bit shy to make contributions, but that changed towards the end.	*Self-reflection; awareness of own learning*

Table 6: Views on incorporation of basic elements of effective cooperative learning

Responses with regard to cooperative learning	*Links to SDL*
Knowledge about these helped me to understand my role in the group and cleared up my responsibility for my own and their learning. I can cooperate better with my fellow students if I understand my responsibilities.	*Take responsibility for own learning*
Although I was dependent on them I also realised that I was responsible for my own learning. I had to realise that other people's opinions are valid and that I can learn from them and their experiences. I had to learn to listen and not just talk.	*Take responsibility for own learning* *Effective communication*
I feel that the group work improved our communication skills, since you have to speak you mind. You are responsible for your own work as well as for the groups', so you grow closer to the other students and get to know them well. The group evaluation helped me to compare my contributions with that of the other students.	*Effective communication* *Take responsibility for own learning*
Cooperative learning influenced me positively and made me positive about my work.	*Motivation*
This was the first time that [the basic elements of effective] cooperative learning was discussed with us. If all the lecturers follow this method students will be much more positive about group work and will one day be able to apply it better in their own classrooms. The element of individual accountability is important to ensure that students who work hard are not disadvantaged by those who do not do their part. I would like to use cooperative learning like this again in future since I have learned a lot from the other students.	*Implement learning strategies effectively* *Apply learning in new contextAwareness of own learning*

member of the group brought to the group, the help that group members received from one another, the fact that members of the group consulted and worked together to solve a problem, and the fact that they were able to learn to trust the other members of the group as shown on Table 7. In this particular analysis, the participants' responses link to the SDL aspects of *being competent in knowledge and skills needed for the task*, *awareness of own learning*, *taking initiative and accepting responsibility for own learning*, *identifying own learning needs*, and *goal orientation* (see Table 7). In terms of Williamson's (2007) broad areas of SDL, the responses link to the areas of *learning strategies* and *awareness*.

Table 7: View of cooperative learning afterwards

Responses with regard to cooperative learning	*Links to SDL*
I enjoyed it and found it easier to understand the work during the cooperative learning sessions, because everybody brings their knowledge to the group and consequently you get a bigger idea about the learning content.	*Being competent in knowledge and skills of the task*
Cooperative learning really helped me a lot. If it wasn't for my fellow-group members I often would not have been able to complete the tasks.	*Awareness of own learning*
It was positive to work together with fellow-students since everybody helps each other. It also improved my own responsibility because the group relied on one another's work.	*Take responsibility for own learning*
I learned a lot from hearing other students' opinions on topics and found their ideas interesting. When we struggled with a task or had no idea what was expected from us, we put heads together and came up with a solution.	*Take initiative and accept responsibility for own learningIdentify own learning needs Goal orientation*
The first time with group work it was difficult for me not to take over and do everything myself, but later it became easier to trust the other students.	*Effective collaboration with peers*

DISCUSSION

In the initial measurement, which was taken at the beginning of the semester, the students' self-rating of their level of SDL ranged from "moderate" to "high". The students rated themselves to a considerable extent as being self-directed in learning. These findings are consistent with those of Golightly and Brockett (2010), who found that all of the participants in their research rated their level of SDL on the margin between "high moderate" to "low high". At the end of the semester, all of the students except one rated their level of SDL higher than they did previously; all of the students rated it in the "high" range. This is also consistent with the findings of Strods' (2010) research, which show that participants perceived an improvement in their level of SDL after being involved in cooperative learning activities. The one student whose post-test score dropped had a high pre-test score relative to the other students, which means that the 2 points that her score dropped by are negligible. Individual students rated several areas of SDL, particularly areas related to use of appropriate *learning strategies*, *evaluation of own learning*, and *interpersonal skills*, as having shown improvement.

At each instance after one or two of the five basic elements of effective cooperative learning were incorporated into the students' cooperative learning activities, the students' individual feedback yielded more information about their experience of the cooperative learning task than it did about SDL, which was expected, since the question that was posed to the students related to their experience of the cooperative learning task. Linking of the students' responses to aspects of SDL shows that incorporation of the five basic elements of cooperative learning mainly enhanced the students' awareness of effective collaboration with peers, effective communication, self-reflection, and self-efficacy. Other aspects related to SDL that were mentioned include the use of feedback to self-adjust, awareness of own learning, and evaluation of own learning. It thus seems that incorporation of the five basic elements of effective cooperative learning had the most influence in Williamson's (2007) broad areas of *awareness*, *evaluation*, and *interpersonal skills*. This is consistent with the findings of the questionnaire with regard to *evaluation* and *interpersonal skills*, but a difference is that with the questionnaire it seems that the use of appropriate *learning strategies* was enhanced, while the individual feedback focuses more on *awareness*. Since no other recent research on how students' engagement in cooperative learning activities that incorporate the five basic elements influence their development in the different areas of SDL could be found, this research may set a platform for future research in this regard.

In response to the open-ended questions regarding the effect of incorporation of the five basic elements of cooperative learning on the students' respective views of cooperative learning, different students perceived certain aspects to have had more of an effect than other aspects. More frequently mentioned aspects were effective collaboration with peers, effective communication, and personal responsibility, which can be linked to Williamson's (2007) areas of *awareness* and *interpersonal skills*. Each of the participants reported that incorporation of the basic elements of effective cooperative learning had changed their view of group work for the better, which may have positive implications for their development as self-directed learners.

A notable finding was that neither the questionnaire nor the individual feedback or the open-ended questions yielded any results related to Williamson's (2007) area of *learning activities* (which one needs to engage in to become self-directed in learning). This may indicate that cooperative learning as a teaching and learning strategy should be structured in a way that addresses this shortcoming, if the cooperative learning is aimed at promotion of SDL and lifelong learning.

CONCLUSION

In this particular research, it would seem that incorporation of the five basic elements of effective cooperative learning into the students' cooperative learning activities changed the students' views and experiences of group work for the better. At the same time, some aspects related to the students' level of SDL, including awareness of factors contributing to SDL, use of appropriate learning strategies, evaluation of own learning, and interpersonal skills, may have been enhanced.

RECOMMENDATIONS

It is recommended that future research on the effect of incorporation of the basic elements

of effective cooperative learning on SDL be conducted over a longer period of time, to allow for greater development of positive interdependence and individual accountability. Further studies should include a larger number of participants. A limitation of this research is the small sample size. Nevertheless, the data were consistent, and they provide a basis for further investigation. The open-ended questions should also include one or more questions focusing specifically on the aspects of SDL, for example *"Do you feel that the cooperative learning approach changed your approach to learning in terms of accepting more responsibility for your own learning?"* Attention should further be given to selecting learning tasks that are suitable for cooperative learning, but that will also contribute to the development of SDL. The tasks should be of such a nature that they require that members of the group be dependent on one another, and that successful completion of the task be contingent upon each member of the group taking individual responsibility to contribute to the completion of the task. Attention should also be given to selecting tasks that will actively engage students in learning activities that will be conducive to enhancing SDL. It is also recommended that students' metacognitive regulation with regard to monitoring and control of their own learning be explicitly developed.

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