

Knowledge creation and transfer amongst post-graduate students

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Background: The skill shortages, hyper-competitive economic environments and untapped economies have created a great deal of focus on knowledge. Thus, continuously creating and transferring knowledge is critical for every organisation.

Objectives: This article reports on an exploratory study undertaken to ascertain how knowledge is created and transferred amongst post-graduate (PG) students, using the knowledge (socialisation, externalisation, combination, internalisation [SECI]) spiral model.

Method: After reviewing relevant literature, a personally administered standardised questionnaire was used to collect data from a convenience sample of PG students in the School of Management, IT and Governance at the University of KwaZulu-Natal, South Africa. The data was analysed to determine if it fit the model based on the four modes of knowledge conversion.

Results: Although the School of Management, IT and Governance has mechanisms in place to facilitate knowledge creation and transfer, it nevertheless tends to focus on the four modes of knowledge conversion to varying degrees.

Conclusion: The study confirmed that PG students utilise the 'socialisation' and 'externalisation' modes of knowledge conversion comprehensively; 'internalisation' plays a significant role in their knowledge creation and transfer activities and whilst 'combination' is utilised to a lesser extent, it still plays a role in PG students' knowledge creation and transfer activities. PG students also have 'space' that allows them to bring hunches, thoughts, notions, intuition or tacit knowledge into reality. Trust and dedication are common amongst PG students. With socialisation and externalisation so high, PG students are aware of each other's capabilities and competencies, and trust each other enough to share knowledge.

Introduction

Information on demand is a powerful aspect of the mode in which academic organisations, teams and individuals operate. There is a constant need for academic organisations, teams and individuals to accelerate the communication of information and knowledge to each other and organisations outside the academic sphere (Nelson 2005). An individual is often afraid to share their knowledge and they have a tendency to guard their knowledge and selectively release it. This tendency is often cited as a core problem when working in a team and the cause of poor collaboration between team members (Gilmour 2003). In order to leverage on innovation as one of the most important sources of competitiveness and success, academics need to have access to and mobilise their knowledge resources (Voelpel, Von Pierer & Streb 2006).

Knowledge is generally separated into two types: explicit and tacit knowledge. Hautala (2011:605) explains that 'academic knowledge aims at creating or exploring the new' tacit and explicit elements, which together with theory and practice are used to form knowledge. Tacit knowledge is a personal, contextual and practical entity that is difficult to communicate (Polanyi 1966). For example, balancing a bicycle to ride it requires tacit knowledge that is not easy to explain to someone who has never actually ridden one. Similarly, understanding and conducting a research project as part of an academic field, research group and society also includes tacit knowledge (Hautala 2011:605).

Davenport and Prusak (1998:81) argue that codifying tacit knowledge is difficult, but that 'its substantial value makes it worth the effort'. Notwithstanding some of the challenges cited by the scholars and practitioners referenced above, the decision to focus only on tacit knowledge instead of knowledge in general can be justified by reasons that include, but are not limited to, its substantial volume and value to the organisation (Suppiah & Sandhu 2011). The ability to create, store, disseminate and utilise knowledge and expertise has become a primary way for organisations, teams and individuals to compete (Hayashi 2004). Amassing and synthesising

specialised knowledge from multiple sources is a pivotal factor in resolving the technical and operational uncertainties that impede Nonaka and Takeuchi's (1995) knowledge (SECI) spiral theory.

In light of the above, this article focuses on determining which of the four modes of knowledge conversion assist post-graduate (PG) students to access information on demand.

It is widely accepted that there is difficulty in disseminating tacit knowledge, since tacit knowledge is personal and understandable by the possessor (Alavi & Leidner 2001; Nonaka & Takeuchi 1995; Polanyi 1966). Thus, this study also attempts to establish, through an assessment of the knowledge spiral, if extracting tacit knowledge or engaging with explicit knowledge is essential for a paradigm shift when transcending from the old self to the new self.

Literature review

The genesis of the knowledge (SECI) spiral process

Knowledge is sought and shared in a global arena, whether at a corporate or academic level (Hautala 2011). McKenzie and Van Winkelen (2011) argue that:

sound decisions rely on having the right knowledge in the right place at the right time, to be able to act effectively. 'Right' knowledge may be different for every decision – some decisions require only surface knowledge, some require more investigation and an evidence base, some use tacit expertise, and others creative insight, intuition and judgment. (p. 403)

Rai (2011) believes that despite the subtle differences between the various knowledge definitions, scholars agree that effective and efficient knowledge management is central to organisational performance and success. In order to assess the capacity of an organisational system to generate new knowledge, the first step is to define knowledge and then how to determine if it is 'new' knowledge, as the aforementioned has a justified belief that increases an entity's capacity for effective action (Arling & Chun 2011).

The conversion of tacit knowledge into explicit knowledge helps knowledge to be crystallised and shared by others, which becomes the basis for the creation of new knowledge. The successful conversion of tacit knowledge into explicit knowledge depends on the sequential use of metaphor, analogy and models (Rai 2011). The materialisation of new knowledge always begins with the individual. A resourceful individual may become conscious of a position that has not been developed, which may lead to the growth or advancement of a product, service or theory. An individual's personal knowledge is transformed into organisational knowledge that is valuable to the company. Making personal knowledge available to others is the central activity of the knowledge-creating company. Nonaka and Konno (1998:26) argue that 'it takes place continuously and at all levels of the organisation', in that one's personal knowledge is transformed into organisational knowledge through the interactions between tacit knowledge and explicit knowledge.

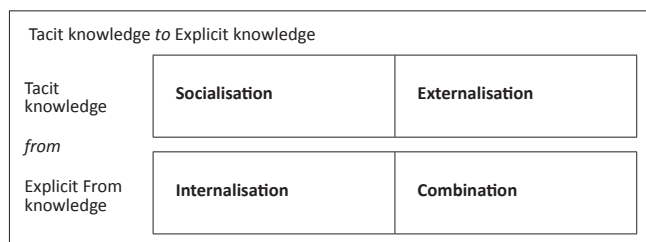
Within several loops of interaction where community members share their experiences, ideals and ideas, new knowledge – individual as well as collective knowledge – emerges through this process (Renzl 2006). Oguz and Sengün (2011:446) argue that Nonaka and Takeuchi (1995) popularised tacit knowledge in the management literature. Using the example of the bread master, they promote the link between tacit and explicit knowledge. Their work legitimised the tacit-explicit dichotomy by viewing the two as separate spheres of knowledge. Even though they cite and use Polanyi (1966) approvingly, the ontological dimension of knowing remained inconspicuous. In their view, knowledge creation is the result of an interactive spiral between tacit and explicit knowledge. This rendition has been widely accepted in most of the following literature and has created the tendency to see tacit and explicit knowledge as substitutes (e.g. Nonaka & Takeuchi 1998). According to Nonaka and Takeuchi, there are four ways of converting between tacit and explicit knowledge; these are: socialisation (tacit to tacit), externalisation (tacit to explicit), combination (explicit to explicit) and internalisation (explicit to tacit).

Grant (2007) views tacit knowledge as the ability or skill of an individual to do something or to resolve a problem that is based, in part, on one's own experiences and learning, and probably not all of this knowledge can be shared between individuals. Capturing tacit knowledge is seen as the challenge to organisations that want to spread knowledge throughout the organisation or spur greater innovation. It is treated as a reserve deposited deep within the ground that needs to be detected and then pumped out (Mooradian 2005).

The aforementioned development led Nonaka and Takeuchi (1995), the pioneers of the knowledge spiral model, to believe that tacit and explicit are not totally separate but mutually complementary entities; this led them to further develop the notion that tacit and explicit knowledge interact with and interchange into each other in the creative activities of human beings. The interaction between tacit and explicit knowledge is known as knowledge conversion, which consists of four modes. Girard (2006) believes that the four modes of knowledge conversion need to operate in sync. The four modes of knowledge conversion consist of socialisation, externalisation, combination and internalisation, which are shown in Figure 1. It is important to stress that the success of each mode of knowledge conversion will depend on the leadership and culture of the organisation or team. After all, managing knowledge is all about creating a culture that will institutionalise trust and facilitate knowledge creation, transfer and storage (Kermally 2002). Socialisation helps to move knowledge in tacit form between individuals (in this instance post-graduate students), externalisation is the application of tacit insights on an outside entity, combination represents the act of synthesising explicit pieces of knowledge and finally internalisation is the process through which one increases one's knowledge by learning from external events (Desouza & Awazu 2006).

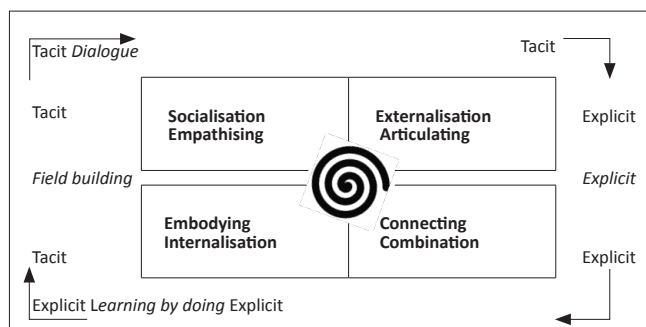
Knowledge (SECI) conversion refers to the four modes of knowledge creation identified by Nonaka and Takeuchi (1995): socialisation that transfers tacit knowledge, externalisation that converts tacit knowledge into explicit knowledge, combination that integrates explicit knowledge and internalisation that embodies new tacit knowledge (Choo & Drummond de Alvarenga Neto 2010). The knowledge conversion (SECI) process (Figure 2) is deemed to be the blueprint for the knowledge spiral model (Figure 2), where the interaction or dialogue between the modes plays an integral role in knowledge creation and transfer.

Arling and Chun (2011) and Perez-Araos *et al.* (2007), after an examination of Alavi and Leidner's (2001) and Nonaka and Takeuchi's (1995) research respectively, explain that socialisation is the process of converting one individual's tacit knowledge to another individual's tacit knowledge through interpersonal interaction. Tacit knowledge to tacit knowledge (socialisation) is a process of sharing experiences in a direct face-to-face approach to create tacit knowledge, often done through shared mental models, technical skills, observation, imitation and practice. Externalisation is the process of converting tacit knowledge to explicit knowledge. Tacit knowledge to explicit knowledge (externalisation) is a knowledge creation process where a part of tacit knowledge is articulated and turned somehow into explicit form, through analogies, concepts, hypothesis, models, reports, and so on. Combination is the process of creating new explicit knowledge by reconfiguring, re-categorising and re-conceptualising existing explicit knowledge. Explicit knowledge to explicit knowledge (combination) is a process of combining different bodies of explicit knowledge and internalisation is the process of converting explicit knowledge to tacit knowledge.



Source: Adapted from Nonaka, I. & Takeuchi, H., 1995, *The knowledge creating company*, Oxford University Press, New York

FIGURE 1: Four modes of knowledge conversion.



Source: Adapted from Nonaka, I. & Takeuchi, H., 1995, *The knowledge creating company*, Oxford University Press, New York

FIGURE 2: The knowledge spiral.

Explicit knowledge to tacit knowledge (internalisation) is a process of embodying explicit knowledge into tacit knowledge by experiencing knowledge through the explicit source (learning-by-doing approach).

Nonaka and Takeuchi's (1995) knowledge (SECI) spiral model is reliant on the interaction between the micro and macro environments, and changes occur at both the micro and the macro level; an individual (micro) influences and is influenced by the environment (macro) with which they interact (Little, Quintas & Ray 2002).

Against the brief literature review, this study explored knowledge creation and transfer amongst PG students at a research university.

Research methodology

An exploratory research design was employed based on Saunders *et al.*'s (2007:133) affirmation that 'an exploratory study is a valuable means of finding out what is happening; to seek new insights; to ask questions and to assess phenomena in a new light'. Furthermore, Sekaran (2003:119) argues that 'exploratory studies are undertaken to better comprehend the nature of the problem since few studies might have been conducted in that area'.

This study was quantitative in nature, since:

quantitative methods require the use of standardized measures so that varying perspectives and experiences of people can be fitted into a limited number of predetermined response categories to which numbers are assigned. (Patton 2002:14)

Furthermore:

the advantage of a quantitative approach is that it's possible to measure the reactions of many people to a limited set of questions, thus facilitating comparison and statistical aggregation of the data. This gives a broad, generalizable set of findings presented succinctly and parsimoniously. (Patton 2002:14)

A questionnaire was used, which comprised a five-point Likert scale that ranged from 1–5 (with 5 = strongly agree and 1 = strongly disagree). The responses were converted to frequencies and percentages, and the results were related to Nonaka and Takeuchi's (1995) knowledge (SECI) spiral model and interpreted accordingly.

As a first step in deciding on the sample, all PG students in the School of Management, Information Technology & Governance, at the University of KwaZulu-Natal constituted the target population. The reason for choosing this group of 'knowledge creators' was a matter of convenience, since a sample from this population would have been easily accessible, since they comprised individuals who were known to the primary researcher. According to McBurney and White (2007) the sampling frame is a population as it is defined for the purposes of selecting subjects for a study; in the context of this study, the *sampling frame* is all accessible post-graduate students in the School of Management, Information

Technology & Governance. The *sample size*, which required making some judgement about the number of participants needed for the study (Devlin 2006), was determined using a non-probability sampling technique, namely convenience sampling. The population of post-graduate students comprises 204 honours students and 132 master's and PhD students. The total number of post graduate students (336) was used in the calculation of the sample size. Using a confidence level of 95% with a confidence interval of 12 results in a sample size of 56 required whilst a confidence level of 95% with a confidence interval of 10 results in a sample size of 75. It was therefore decided to use a sample size within the range of 56 and 75. Approximately 60 students were targeted. The researcher collected 70 completed questionnaires.

Sekaran (2003) explains that for personally administered questionnaires:

when a survey is confined to a local area, and the organisation is willing and able to assemble groups of employees to respond to the questionnaires at the workplace, a good way to collect data is to personally administer the questionnaires. The main advantage of this is that the researcher or a member of the research team can collect all the completed responses within a short period of time. Any doubts that the respondents might have or any question could be clarified on the spot. (p. 236)

Thus, the questionnaires were personally administered to the PG students.

The reliability of a measure, which indicates the 'extent to which it is without bias (error free) and hence ensures consistent measurement across the various items in the instrument' (Sekaran 2003:203), is reliant on the stability and consistency with which the instrument measures the concept, model or theory. The internal consistency of the measure was maintained as all the sections of the questionnaire focused on measuring if the adaptation of Nonaka and Takeuchi's (1995) knowledge (SECI) spiral model has an influence on the way knowledge is created and transferred by PG students.

Sekaran (2003) proposes that validity is concerned with the authenticity of the cause-and-effect relationships (internal validity), and their generalisability to the external environment (external validity). Although there are several ways of testing validity, this study focused on content validity which is the best test of validity for a questionnaire. Content validity ensures that the measure includes an adequate and representative set of items that tap the concept, theory or model. The questions based on Nonaka and Takeuchi's (1995) knowledge spiral is an adequate and representative set of items that tap into the way knowledge is created and transferred by PG students. The questions are dimensions and elements of Nonaka and Takeuchi's knowledge (SECI) spiral model. For completeness, see the questionnaire in Annexure 1.

Empirical findings

The majority (93%) of respondents were honours students. The remaining 7% were master's students and PhD students. A total of 380 questionnaires were administered.

The Likert scale that was used in the questionnaire had five categories. For the purpose of analysis, all 'strongly agree' and 'agree' responses were collapsed into one category, namely 'agree' because it can be seen from the results that even if 'neutral' is combined with 'disagree' and 'strongly disagree', the results would not be changed.

The use of socialisation

The first mode of the knowledge conversion process, *socialisation*, is determined by seven statements. Table 1 reflects the respondents' agreement or disagreement with each statement.

It is evident from the information in Table 1, that the overwhelming majority of respondents agreed with all seven statements, implying that the 'socialisation' mode was effective in knowledge creation and transfer amongst the PG students.

Use of combination

The third mode of the knowledge conversion process, *combination*, is determined by six statements in the questionnaire.

It is evident from Table 2, that since a two-thirds majority was not achieved for some statements pertaining to 'combination', the 'combination' mode is not predominantly used by the PG students. This confirms that transforming tacit knowledge to explicit knowledge is not a significant activity in the knowledge creation and transfer process.

TABLE 1: Respondents' use of socialisation.

Response	% Who agreed
'I will actively share my experience with others'	82.9
'In my academic team, my teammates and I will share life or work experience with each other'	84.3
'During group discussion, I try to find out others' opinions, thoughts and other information'	94.3
'During discussion, I will bring out some concepts, thoughts or ideas'	92.9
'I often encourage others to express their thoughts'	87.1
'Before group discussion, I will collect necessary information and show it to the group'	68.6
'I like to get to know the people with whom I will work before going into a project together'	75.7

Source: Developed by researchers from the research data

TABLE 2: Respondents' use of combination.

Response	% Who agreed
'During the discussion, I tend to organise ideas and make conclusions to facilitate the discussion'	74.3
'When coming across problems, I tend to use my experience to help solving problems'	84.3
'After every event, I have the habit of organising and making a summary of what happened'	58.6
'During discussion, I will organise everyone's thoughts in my mind'	61.4
'I like to collect new information and make a connection of new and old knowledge to work up new concepts'	77.1
'I like to organise ambiguous concepts into structure'	63.33

Source: Developed by researchers from the research data

The use of internalisation

Five statements (Table 3) served to ascertain information about the respondents' 'internalisation' of information. From Table 3, it is evident that for the majority (four-fifths) of the statements that comprised 'internalisation,' the sample was in agreement, which implies that this mode is predominantly being used by the PG students in the School of Management, Information Technology & Governance, at the University of KwaZulu-Natal.

The use of externalisation

The second mode of the knowledge conversion process, externalisation, was determined by seven statements.

In order to ascertain whether the mode of 'externalisation' is predominantly used by the PG students, at least a two-thirds majority (66%) agreement (Table 4) with each of the seven statements is required. The study revealed that there was overwhelming agreement for each individual statement. Therefore, the 'externalisation' mode is effective and being frequently used by the PG students. This shows that PG students are able to articulate their tacit knowledge to explicit knowledge effectively, or that there are academic mechanisms in place to help post-graduate students transform their tacit knowledge into explicit knowledge.

Recommendations

More research should be carried out on how knowledge is created and transferred by PG and undergraduate students on a larger scale, since students are the individuals that

TABLE 3: Use of internalisation.

Response	% Who agreed
'After hearing a new idea or concept, I tend to compare it with my experience to help me comprehend the meaning'	78.6
'I understand others' thoughts better by repeating what they said and asking them "Is this what you mean?"'	78.6
'I will tell others what I think to make sure my understanding is the same as theirs'	84.3
'When I have finished saying something, I will ask the other person if it is necessary to repeat to make sure they understand exactly what I mean'.	60.0
When communicating with others, I will give others time to think about we discussed	77.1

Source: Developed by researchers from the research data

TABLE 4: Respondents' use of externalisation.

Response	% Who agreed
'When others can't understand me, I am usually able to give them examples to help explaining'	95.7
'Most of the time, I can transcribe some of the unorganised thoughts into concrete ideas'	68.6
'I can describe academic or technical terms with conversational language to help communicate in a group'	82.9
'I tend to use analogy when expressing abstract concepts'	84.3
'When I try to express abstract concepts, I tend to explain with examples'	94.3
'I will help others to clearly express what they have in mind by encouraging them to continue what they are saying'	87.1
'When others cannot express themselves clearly, I usually help them clarify their points'	75.7

Source: Developed by researchers from the research data

directly deal with the generation, transfer and storage of knowledge in academic institutes. Both qualitative and quantitative research should be carried out in this area using a larger sample size, at least 1000 students, depending on the student population of the university. Future research in addition should concentrate on the conditions that drive the knowledge spiral process, the five-phase model of the organisational knowledge-creation process (in an academic context) and the factors that affect the knowledge spiral process and the individual modes of knowledge. Moreover, the researcher strongly believes that a study should be done to compare new joiners in corporate university graduate programs, post-graduate students and undergraduate students. A study of the influence of trust, communication, culture, organisational networks, technical infrastructure and other influences such as investment should be carried out, to determine their effects on knowledge creation and transfer in academic institutes. Future studies should also compare knowledge creation, transfer and storage in South African academic institutions with that of other American, European and Asian academic institutions; it should be country specific. This will help to gauge if there are any similarities or differences between academic institutions other than political, social and economic differences. This would also enable future researchers to observe the cultural differences between students or academic institutions.

Future studies on knowledge conversion activities in academic institutes should focus on the years of existence, number of students, faculty, schools and the academic year of the student. Furthermore, future research should determine if students in specific years of study and who have certain access to academic knowledge mechanisms are more adept at creating, transferring and storing knowledge. Finally, as the culture of the university could not be established with a single school or a few disciplines, the author strongly believes that multiple colleges should be surveyed to determine if a knowledge creating and transfer culture exists.

Conclusion

The aim of this study was to assess how knowledge is created and transferred amongst PG students, using Nonaka and Takeuchi's (1995) knowledge (SECI) spiral model. The study confirmed that PG students utilise the 'socialisation' and 'externalisation' modes of knowledge conversion comprehensively; 'internalisation' plays a significant role in their knowledge creation and transfer activities too, whilst 'combination' is less utilised but still plays a role in their knowledge creation and transfer activities. PG students have space that allows them to bring hunches, thoughts, notions, intuition or tacit knowledge into reality. Trust and dedication are common amongst post-graduate students. With the use of 'socialisation' and 'externalisation' so high, PG students are aware of each others' capabilities and competencies, and trust each other enough to share the knowledge.

As 'socialisation' and 'externalisation' received the majority of the positive responses, the activities associated with these

modes will illustrate the trusted source of information and knowledge. Therefore, brainstorming, informal meetings, discussions, dialogues, observation, mentoring, learning groups, as well as meetings, building hypotheses and models, pictures for communication, after-action reviews, workshops, master classes, assignment databases, best practice exchange, diagrams, illustrations, sketches, metaphors and analogies are the trusted sources of information and knowledge for post-graduate students at the School of Management, Information Technology & Governance, at the University of KwaZulu-Natal.

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Competing interests

There are no financial or non-financial competing interests inherent in the publication of this article, other than the fact that it was extracted from the mini-dissertation of a master's student, whose study was co-supervised by the co-authors.

Authors' contributions

K. Naicker (University of KwaZulu-Natal) is the author of the mini-dissertation from which this article was extracted. However, the article was primarily written by the research supervisor K.K.G. (University of KwaZulu-Natal; Regenesys Business School) and formatted and edited by K. Naidoo (University of KwaZulu-Natal), the co-supervisor.

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Annexure 1 starts on the next page →

Annexure 1

Questionnaire

SECTION A

1. Biographical questions

1.1 Are you a(n)

Honours student	Master's student	PHD student
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1.2 Are you

<18 years	18–20 years old	21–23 years old
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24–26 years old	27–29 years old	>30 years
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1.3 Are you a

Full-time student	Part-time student
<input type="checkbox"/>	<input type="checkbox"/>

1.4 Are you permanently employed?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

1.5 Are you

Male	Female
<input type="checkbox"/>	<input type="checkbox"/>

SECTION B

2. Internalisation

2.1 After hearing a new idea or concept, I tend to compare it with my experience to help me comprehend the meaning.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.2 I understand better by repeating what was said and by asking 'Is that what you mean?'

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.3 I will tell others what I think to make sure my understanding is the same as theirs.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.4 When I have finished saying something, I will ask the other person if it is necessary to repeat what I said, to make sure they understand exactly what I mean.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.5 When communicating with others, I will give them time to think about we discussed.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.6 I understand better by repeating what was said and by asking 'Is that what you mean?'

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Externalisation

3.1 When others can't understand me, I am usually able to give examples to help them understand.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2 Most of the time, I can transcribe some of the unorganised thoughts into concrete ideas.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.3 I can describe academic or technical terms with conversational language to help communication in a group.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.4 I tend to use comparisons when expressing abstract concepts.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.5 When I try to express abstract concepts, I tend to explain using examples.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.6 I will help others to clearly express what they have in mind, by encouraging them to continue what they are saying.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.7 When others cannot express themselves clearly, I usually help them clarify their points.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Socialisation

4.1 In academic group discussions, I will actively share my experience with others.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 In my academic team, my teammates and I will share life or work experiences with each other.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Annexure 1 continues on the next page →

4.3 During group discussion, I try to find out others' opinions, thoughts and other information.

Strongly agree Agree Neutral Disagree Strongly disagree

4.4 During discussions, I will bring out some concepts, thoughts or ideas.

Strongly agree Agree Neutral Disagree Strongly disagree

4.5 I often encourage others to express their thoughts.

Strongly agree Agree Neutral Disagree Strongly disagree

4.6 Before group discussions, I will collect necessary information and show it to the group.

Strongly agree Agree Neutral Disagree Strongly disagree

4.7 I like to get to know the people with whom I will work before going into a project together.

Strongly agree Agree Neutral Disagree Strongly disagree

5. Combination

5.1 During a discussion, I tend to organise ideas and make conclusions to facilitate the discussion.

Strongly agree Agree Neutral Disagree Strongly disagree

5.2 When I come across problems, I tend to use my experience to help solve them.

Strongly agree Agree Neutral Disagree Strongly disagree

5.3 After every event, I have the habit of organising and summarising what happened.

Strongly agree Agree Neutral Disagree Strongly disagree

5.4 During discussions, I will organise everyone's thoughts in my mind.

Strongly agree Agree Neutral Disagree Strongly disagree

5.5 I like to collect new information and make a connection between the new and old knowledge to develop new concepts.

Strongly agree Agree Neutral Disagree Strongly disagree

5.6 I like to organise ambiguous concepts into a structure.

Strongly agree Agree Neutral Disagree Strongly disagree

Thank you for your participation.

Source: Developed by primary researcher