Incorporating higher order thinking skills in task-based learning for Malaysian undergraduates

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Abstract

This study aimed at investigating the incorporation of higher order thinking skills in seeking information while completing their coursework project work. Specifically, it compares and contrasts the learning components which facilitates the incorporation of higher order thinking skills in their coursework completion. A total of 45 undergraduates completed a questionnaire upon submitting their final project work. The students' feedback was also recorded and triangulated with their final course work marks. The result illustrates that students lacked the comprehensive understanding of gathering data, evaluating data critically and managing their resources scholarly although they were able to identify, scope, plan and present their data well. The level of thinking remained towards staying within the information given instead of going beyond the information. Thinking and engaging critically on the subject matter requires careful incorporation of higher order thinking skills (HOTS). As the levels of thinking are less conceptualized in English Language teaching activities, the teachers need to know the different learning components that remain a challenge to the students in order to integrate HOTS in their ELT activities effectively; particularly in accomplishing coursework projects. This study is significant in providing fundamental insights into incorporating HOTS in teaching for overcoming challenges in language teaching, learning and research among undergraduates and has implications on designing a more cognitive development approach in language learning lessons.

Keywords*:* Higher order thinking skills, ELT, lesson design, task-based language courses

1. Introduction

Task-based projects are crucial in English Language learning as they facilitate and develop practical linguistic skills for meaningful language learning outcomes (Rozati, 2014; Ellis, 2006; Nunan, 2004). However, teachers essentially need to know the different learning components that remains a challenge to the students in order to deliver the specific learning outcomes from the teaching and learning activities. Learning outcomes are specific statements that articulate what the students are able to do at the end of the course. The outcomes may incorporate learning objectives although they are not synonymous (Allan, 1996) and can be identified in Bloom's three domains of learning, mainly cognitive, affective and psychomotor skills. Within each of these domains, Bloom (1956) proposed the ascending order of complexity. Yet, the outcomes that requires higher order thinking skills cannot be easily expressed as they are related to cognitive skills. In relation to language courses, the context of thinking levels are said to be less conceptualized (Waters, 2006) but current trend in graduate education stresses on competences that are transversal to prepare students for the real world (Jaganathan et al., 2014). How can we display the level of thinking and competence of students from the language courses then? To date, Bloom's (1956) six levels of thinking skills, has provided a firm foundation to outlining the cognitive skills as a measurable component of learning whereby "outcome verbs" provides indicators to the students' level of thought. At the tertiary level, defining thinking skills may vary according to the learning outcome that a specific course requires; generally according to the ideation of achieving a higher level of thinking skill or higher order thinking skills as commonly defined for the 21[st]century education. Thus, the elements of application, analysis, synthesis and evaluation as proposed in Blooms (1956) taxonomies of educational objectives underpins the bases of higher order thinking skills for the 21[st]century education. These skills are now defined in terms of transfer of knowledge, critical thinking and problem solving (Brookhart, 2010). The challenge before the educators now is how we can incorporate the higher order thinking skills in language courses, keeping in mind that we need to produce well-developed thinking students who do not merely reproduce facts and information but we need to churn out thinking students who are able to source out information, analyse and interpret them for meaningful learning purposes.

In accomplishing task-based projects and assignments, students resort to the internet as it is easily accessible, fast and abundant. However, managing information load from the world wide web also requires relevant skills that need students to select and manage resources skillfully and critically. Nevertheless, studies have shown that students struggled to access and use information effectively and they often had little understanding of the importance of managing quality resources skillfully (Hayes-Bohana and Spievak, 2008); while some are not prone to asking tough questions to seek further knowledge (Ramasamy, 2011) and thus present sources that may not be credible nor reliable. The students too, sometimes fail to observe academic ethics in producing their project work. Undergraduates who are generally more IT savvy have the opportunity to work independently and make informed choices in identifying the relevant information for their coursework, organising their data and managing the resources scholarly to meet good standards and needs of the tasks. However, managing the resources should be done effectively and as Selcher (2005) noted, undergraduates need to familiarize themselves with good construction of knowledge and habits of critical thinking so that students will be able to connect the learnt concepts with the outside world. Such skills are pertinent in facilitating meaningful task-based learning; otherwise the undergraduates task-based output would merely be a replication of work or in more severe cases the

undergraduates will fail to source information ethically nor understand the essentials of intellectual property, authorship, and copyright as posited by Gabriel (2010). According to Lewis and Smith (2001), if a learner is able to achieve his purpose of learning through the recall of information without interrelating or rearranging the information, then the use of higher order thinking skill does not occur. Given this scenario, this study therefore, seeks to compare and contrast the learning components of undergraduates that facilitate the incorporation of higher order thinking skills in their coursework completion. This study aimed at investigating the incorporation of higher order thinking skills in seeking information while completing their coursework project work. Underpinning Sconul's (1999) model of information seeking, the authors seek to answer the following questions in the study:

i)   At what level of information seeking do the undergraduates utilise higher order thinking skills in completing their coursework project work?
ii)   What component of learning elements facilitates the integration of higher order thinking skills in accomplishing their projects?
iii)   What component of learning elements poses limitations in the integration of higher order thinking skills in accomplishing their projects?

2. Review of Literature

2.1   Conceptualising HOTS in coursework projects

The introduction of higher order thinking skills in learning is not a new phenomenon but is defined variedly in context. Generally, higher order thinking skills refers to the expanded use of the cognition to address challenges in learning - a concept established from Bloom's Taxonomy of Learning (1956) that was expanded to the concept of retention of the learned knowledge (Krathwohl et al., 2001) and is now seen from the viewpoint of transfer of learning, particularly for the 21st century learning skills as mentioned earlier. Brookhart (2010) posits that the transfer of learning lies on the capability of applying critical thinking and problem solving. The concept of transfer and retention was then further expanded connecting the learned knowledge to a higher level as posited by Barahal (2008). These skills, became crucial skill for the 21st century learning to produce lifelong learners. However, these skills are not something new in the practice of teaching and learning. The concept of expanding, interpreting, analysing or manipulating information has long been reiterated for more than a quarter century (Newman, 1990) as this is what encompass the true manifestation of meaningful learning as well as manipulation of the information to reach possible answers in new situations (Lewis and Smith, 1993).

The higher order thinking skills which predominated the science, technical and mathematics subjects are now strongly emphasised in the language courses also to ensure the mastery of soft skills amongst students, particularly via the communication and critical thinking skills. Higher order thinking skills is an important aspect in teaching and learning as it is a useful tool to help students in learning and in improving their performance in dealing with reality of situations. Nevertheless, successful learning programs should not merely focus on teaching information skills, but they should also focus on designing learning experiences that require the use of information skills (Bruce, 2002) that will enable students to acquire a holistic competence in acquiring and managing resources for lifelong learning. Coursework projects provides this avenue for incorporating higher order thinking skills as the students need to

familiarise themselves with good construction of knowledge and habits of critical thinking so that they will be able to connect the concepts learnt with the outside world (Selcher, 2005). Only then, meaningful learning is facilitated and students will be able to produced non-replicated work. Otherwise, the ultimate aim of the teaching and learning process to produce thinking students will fail if the undergraduates lack the ability to source information ethically nor understand the essentials of intellectual property, authorship and copyright (Gabriel, 2010). In one hand, the students need to acquire information ethically to produce their project coursework, find solutions to issues and information they need and they need to transfer the information in an ethical manner in their coursework output; a parallelism to Brookhart's (2010) notion of higher order thinking skills in terms of transfer, critical thinking and problem solving. To become life-long learners, individuals must have access to needed information, and must also be able to judge the quality of the information to which they are exposed to (CQ Research, 2008).

The use of cognitive processing in language learning began from the late 1980s whereby the use of problem-solving activities became more widespread and textbooks incorporated these activities widely to stimulate active thinking to increase content knowledge of the language as well communication skills (Waters, 2006). Yet, the pedagogical impact of facilitating different levels of thinking in ELT activities were said to be due to the vague conceptualization. This is a challenge for undergraduates as higher order thinking skills need to be employed in their assignments. Nevertheless, the conceptual framework and sample activities proposed by Waters (2006) provides a practical guide based on the revised taxonomy of Bloom's cognitive thinking skills in the teaching and learning approach. The levels of thinking beginning from lowest to highest are knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom's Taxonomy) were ordered from simple to complex and from concrete to abstract. Within language courses too, there is a need to teach students to utilise and manage their academic resources scholarly. The implementation of higher order thinking skills, therefore needs to be taught from the beginning of executing of assignment so that the students acquire good skills to be able to retrieve relevant information, critically evaluate it and use it in a ethical manner in both assignments and their professional life as posited by Crawford (2005). This need is crucial nowadays as the infiltration of information in the web plays an intergral part in all learning activities, as students generally source for information to complete their assignments. As the higher order thinking skills paves for further connection of facts obtained from the learning process as posited by King et al. (1998), it helps students to categorize, manipulate, associate and apply the facts in a new way to seek alternate solutions to challenges, problems or situations. Considering the knowledge level in taxonomy of thinking (Bloom,1956) as merely a platform for retention where one recalls and understand what is learnt, students need to make further connection of categorization, manipulation and other association that enables the higher order thinking skills to be incorporated in the teaching and learning activity. For the purpose of teaching, as such, King et al. (1998) fundamental teaching strategies in incorporating HOTS provide practical bases. Among others, Kings et al.(1998) proposed the instructional communication, scaffolding, learning thinking and learning strategies , providing direct instruction , feedback and questioning as well as implementing team activities such as discussion, peer tutoring , cooperative learning and others. Hence, these strategies can be incorporated to enhance the development of higher order thinking skills amongst the students. To produce lifelong learners, the students should have access to needed information, and they must also be able to judge the quality of the information to which they are exposed to as proposed by Candy (2002). Students also need to focus on designing learning experiences that

require the use of information skills (Bruce, 2002) particularly when task-based assignments are given to them. They need to source out the credibililty of the source and know of the validity of the data retrieved from various sources. This are the pertinent characteristics for thinking skills, particularly higher order thinking skills. However, despite the call for integration of higher order thinking skills over the long years, studies have shown that there is still a need to execute its implementation practically as students do not evaluate results and source for information very often (Walraven et al., 2009). Readily available information on the web and information overload provides enormous source that enables easy access. However, students are unclear of validity and reliability of information on the web and often fail to understand what constitutes correct and proper citation (Insley,2011; Wan et al., 2011) or even unethical lifting from the webs (McCake et al., 2001; McMurtry, 2001) that constraints trustworthy information from online.

Robin Collins (2014) in his article, "Skills for the 21st Century: teaching higher-order thinking" reiterated the importance of higher order thinking skills in promoting the transferring of knowledge (Krawthwohl et al., 2001) and finding solution to problems (Brandsfort and Stein, 1984). In framing the possible *transfer for the context* of this study, the skills development is based on King's (1998) development of higher order thinking skills that progresses from the lowest level of prerequisites to making the bridges before attaining the higher order thinking. Thus, students must be able to accomplish the lower order thinking skills (mastery of content) and progress to connecting to the inferences beyond what is presented explicitly. Only when this has been accomplished, the students will be able to apply multidimensional skills of rule to make complex analysis or evaluate and synthesise in higher levels. To do this, however, students need to be exposed of the specific methods employed in enhancing the higher order thinking skills as mentioned earlier. In the local education context too, the call to integrate higher order thinking skills in the teaching curriculum had begun in early 2000 (Nagappan, 2001) and developed in various phases structurally in the curriculum. Realising the pertinence of higher order thinking skills in producing a thinking generation, the Malaysian Education Ministry, has again spelt it out as a core component in the 2013-2025 Malaysian Education Blue Print. While studies have also revolved on measuring various thinking skills disposition (Ramasamy, 2011; Vijayaratnam, 2012), involvement of skills in courses and curriculum (Allen and Wern, 2011; Mahyuddin et al., 2004)) identifying different level of higher order thinking skills among students (Yee, M.H. et al.,2011) as well as others, this study investigates students integration of higher order thinking skills in the process of their coursework completion.

3. Research Methodology

3.1:   *Participants and Project Task*
The study was carried out in a ESP classroom with a sample of 45 respondents in a Malaysian university. The task of the coursework was to complete a case study on language deficit. The project was given in the first week of the semester and students were given a duration of ten weeks to complete it. Each group had five members. At the end of the project, the students had to produce a final project report on language deficit due to brain related problems and present it to the class with relevant audio-visuals evidence.

3.2:   Instrumentation

Students' feedback was recorded and triangulated with their final course work project work. The study employed a mixed-mode approach; the quantitative data was collected to identify the learning components that the students acquire in accomplishing their tasks via a questionnaire adapted from Sconul's (2009, 2011) seven pillars of information literacy. The questionnaire was divided into two sections; Section A on the demographic data while Section B was based on seven variables that determines the learning components involved in accomplishing their coursework task. A total of 49 item questions were provided to gauge how the students accomplish their project work based on competence of integrating the HOTS in their coursework. These variables were matched against Revised Bloom's Taxonomy Action Verbs (Anderson and Krathwohl, 2001) to identify the thinking level. The seven components comprises of 49 items; sub-divided into seven variables and coded in SPSS analyses. The responses were coded based on 5 point Likert scale coded as strongly disagree, disagree, moderately agree/disagree, agree, strongly agree. The variables adapted from Sconul's (1999) guide include the items shown in the table below:

Table 1: Variables and items indicated in the questionnaire

Variables	Items	Components of learning
IDENTIFY	**(7)**	Identify a lack of knowledge in a topic/subject area
		Articulate current knowledge on a topic and define it using simple
		Recognise a need for information and data to achieve a specific end and define limits to the information need
		Use background information to underpin the search
		Take personal responsibility for an information search
		Manage time effectively to complete a search
SCOPE	**(5)**	"Know what you don't know" to identify any information gaps
		Identify which types of information will best meet the need
		Identify the available search tools, such as general and subject specific resources at different levels
		Identify different formats in which information may be provided
		Demonstrate the ability to use new tools as they become available
PLAN	**(6)**	Scope their search question clearly and in appropriate language
		Define a search strategy by using appropriate keywords and concepts, defining and setting limits
		Select the most appropriate search tools
		Identify controlled vocabularies and taxonomies to aid in searching if appropriate
		Identify appropriate search techniques to use as necessary
		Identify specialist search tools appropriate to each individual information need
GATHER	**(8)**	Use a range of retrieval tools and resources effectively

	Construct complex searches appropriate to different digital and print resources
	Access full text information, both print and digital, read and download online material and data
	Use appropriate techniques to collect new data
	Keep up to date with new information
	Engage with their community to share information
	Identify when the information need has not been met
	Use online and printed help and can find personal, expert help
EVALUATE (8)	Distinguish between different information resources and the information they provide
	Choose suitable material on their search topic, using appropriate criteria
	Assess the quality, accuracy, relevance, bias, reputation and credibility of the information resources found
	Assess the credibility of the data gathered
	Read critically, identifying key points and arguments
	Relate the information found to the original search strategy
	Critically appraise and evaluate their own findings and those of others
	Know when to stop
MANAGE (6)	Use bibliographical software if appropriate to manage information
	Cite printed and electronic sources using suitable referencing styles
	Create appropriately formatted bibliographies
	Demonstrate awareness of issues relating to the rights of others including ethics, data protection, copyright, plagiarism and any other intellectual property issues
	Meet standards of conduct for academic integrity
	Use appropriate data management software and techniques to manage data
PRESENT (9)	Use the information and data found to address the original question
	Summarise documents and reports verbally and in writing
	Incorporate new information into the context of existing knowledge
	Analyse and present data appropriately
	Synthesise and appraise new and complex information from different sources
	Communicate effectively using appropriate writing styles in a variety of formats
	Communicate effectively verbally
	Select appropriate publications and dissemination outlets in which to publish if appropriate
	Develop a personal profile in the community using appropriate

personal networks and digital technologies (e.g. discussion lists, social networking sites, blogs, etc

4. Results and Findings

4.1: Demographic Data

The respondents in the study consist of 70% female and a total of 20% of them were non-Malaysians; mainly from Thailand, China, Nigeria and Iran. All the students noted that they have internet access and own personal computers or laptops. A total of 84.4% of the respondents also noted that they owned mobile devices with data.

Table 2: Demographic Data of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	12	26.7	26.7	26.7
Valid	Female	33	73.3	73.3	100.0
	Total	45	100.0	100.0	

Table 3: Respondents Category

		Frequency	Percent	Valid Percent	Cumulative Percent
	Malaysian	36	80.0	80.0	80.0
Valid	Non-Malaysia	9	20.0	20.0	100.0
	Total	45	100.0	100.0	

The duration given to the respondents was ten weeks and the data revealed that the about 77.8% of the students utilised one to four weeks to complete their tasks. Only a total of 8.8% utilised more that 7 weeks to accomplish their tasks. The feedback from the students showed that majority of the respondents only allocated less than 4 weeks to complete their tasks in order to complete their tasks although they were allocated 10 weeks.

Table 4: Duration of Weeks Taken to accomplish Project work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 weeks	13	28.9	28.9	28.9
	3-4 weeks	22	48.9	48.9	77.8
	5-6 weeks	6	13.3	13.3	91.1
	7-8 weeks	1	2.2	2.2	93.3
	9-10 weeks	2	4.4	4.4	97.8
	Others	1	2.2	2.2	100.0
	Total	45	100.0	100.0	

4.2:   *Students' information seeking behaviour in coursework task completion*

The study identified an overall average competence level achieved by the respondents. All the seven variables in the task completion components recorded a score within the range of 2.68 -3.42. The lowest score is 1 while the highest score at 5 point. The average highest mean score of 3.4 point was attained for the *Identify* and *Scope* pillar while the average lowest mean score was recorded for the Gather pillar (2.68) as illustrated in Figure 1.
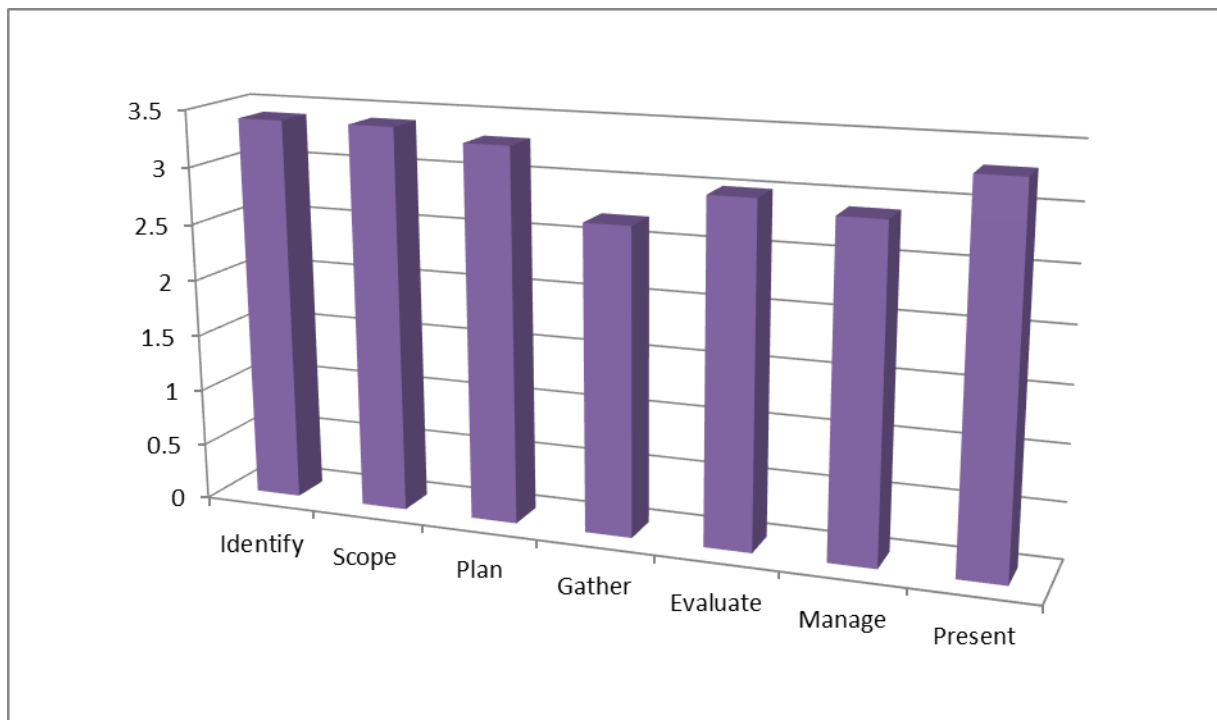
Figure 1: Scores for the steps taken in seeking information to execute project task

4.3. Learning components that facilitates the use of Higher Order Thinking skills

The data showed that the students were able to identify the search topic and define it using simple terminology. For example for the case study on language deficit, all the nine groups were able to identify specific topics using their background information from the course to underpin their research topic. Thus, the topics identified ranged from dyslexia and language problem (2); autism and language deficit (3); auditory processing disorder (1) and language deficit to language disorder among stroke patient (1); down syndrome children (1) and cerebral palsy (1). The evaluation of the presentation and their report articulated their knowledge of the topic they researched on and the students were able to take personal responsibility for an information search on this topics. The personal responsibility was executed with direct interviews with case-study respondents, care-takers, support staffs, medical officers as well as internet search on the topic of language deficit and brain-based language disorder.

Figure 2 below illustrates the elements on which students were able to scope the assignment according to the given task. To scope their study area, the students also were able to identify the types of information needed for their projects and the various information gaps that prevailed during their study. They knew the information gap that they needed to fulfill on the aspects that they are not aware of. Hence, they depended on open web and library resources as a platform to obtain the information. Among others cited included www.news-medical net, brainconnection.brainhq.com/ www.amazon.com, and several others.
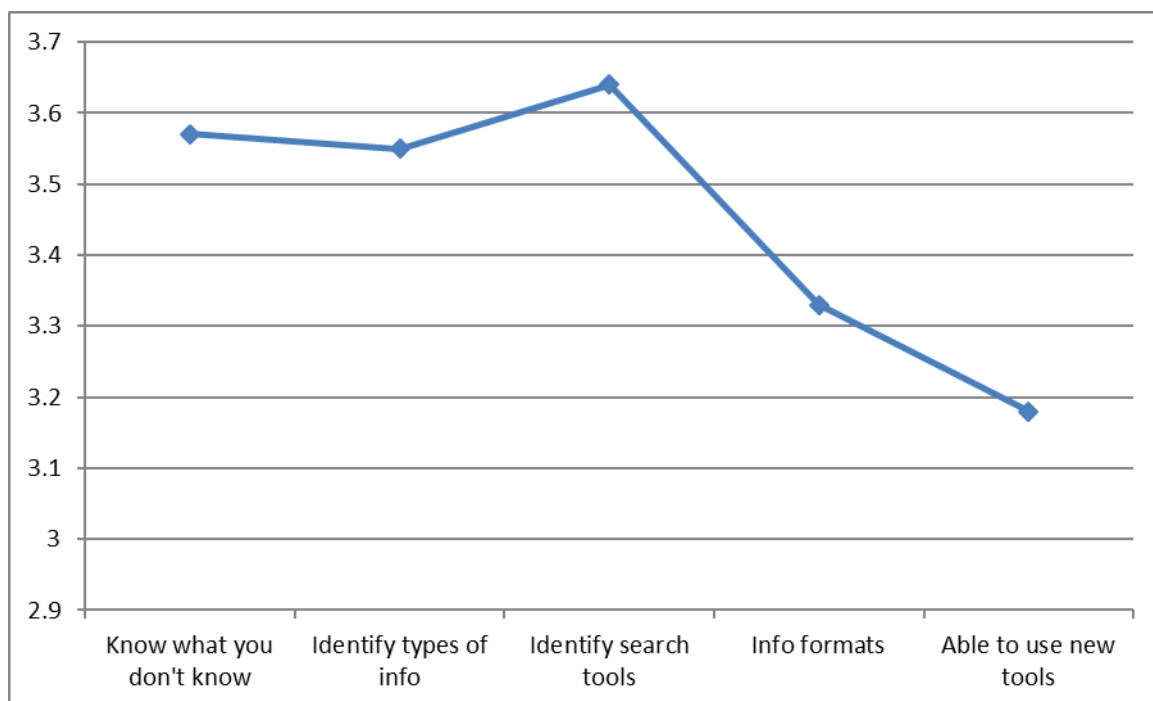

Figure 2: Scores for the sub-elements of Scope

The students also noted that they framed their study topics according to brain related language deficit from a viewpoint of a language student. Based on their interviews with the respondents and observation during their visits to the respondent's homes and learning centers, the students were able to identify and select the specific resources at different levels. Personal visits enabled the students to explore a wide range of issues, challenges and rehabilitation measures used to provide support, care and treatment for the case study. However, all the various information provided were used as supplementary resources for an in depth understanding of the case study. For example, a case study on cerebral palsy involves multiple complications besides the brain deficit. Thus, the scope of their research was limited to the language function of the brain and other aspects related to medical treatment or so was considered beyond the framing of the issue. Given this framing of issue, the students were able to utilize the available internet search tool to obtain the needed subject specific resources and the information was provided in a format that was easily comprehensible. In other words, planning according to the needs of the assignment was successfully executed. For instance, the students were able to explain the difficulty in speech in relation to the Brocha area of the brain. Thus, a recording of the speech was made, transcribed and analysed to see the connection of the deficit to the language problem. In most cases, all the groups provided audio-visual recording and presented their case study in an interesting manner that provoked questioning from other group members. One challenge that was observed, however was that although the students were able to demonstrate the ability to identify new assistive technology for students with learning disabilities, they were not able to utilise the necessary tools to analyse their data; such as the NVivo software. For undergraduates, these elements of software use was not totally crucial, yet students learnt to source for information that will enable them to analyse their data more systematically and validly. Alternatively, although the students were able to identify the information gap that enabled them to go beyond what they know and seek for sources that best meets the aims of their assignment, the time constraint was the greatest challenge to explore further use of the new tools. This is also seen from the data that majority of the groups only allocated less than 4 weeks to complete their project work.

4.3. Limitation in integrating Higher Order Thinking skills - where the problem lies.

The average lowest mean score was recorded for the gathering of information at a score of 2.68.
The data showed that 84.4% of the students had mobile internet access and this facilitated in identifying gaps and strength of the task knowledge. Thus, they were able to use keywords such as "language" and "brain deficit" to identify the need for more information. This enabled them to access and download the full information that they required and use the relevant techniques to collect new data. However, the gathering of the data did not include complex digital nor print search which affected the respondents' ability to keep up to date with new information regarding their search topic.
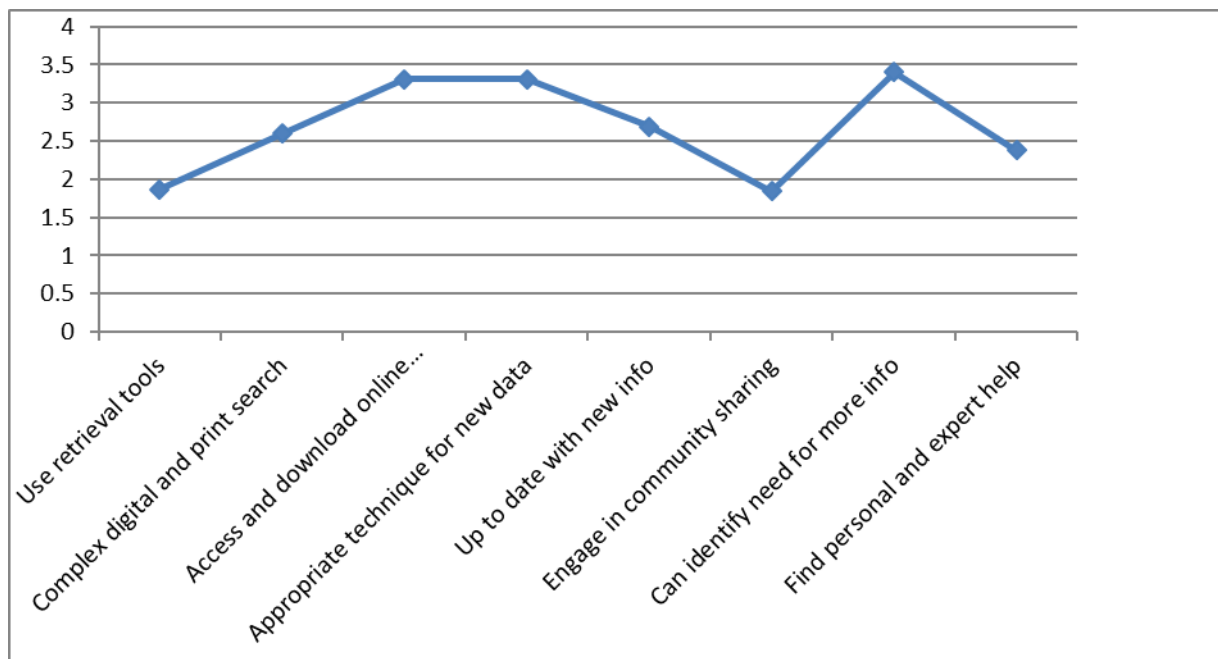
Figure 3 : Score for the Lowest Pillar - Gathering

Apprehension was also shown in using the new tools and the students had very little engagement in the community sharing. Feedback from the students showed that the community sharing only included the participation of the respondents in blog-sharing and chatting with other members via social media use. The concept of community sharing for the respondents were only confined to involving in events such as birthday celebration, children's day party and other smaller in-door events. The students are aware of the support group network for the different learning disability community but they did not join in or participate in their online forums.

5. Discussion and Conclusion

This study aimed at investigating if students utilise higher order thinking skills in seeking information while completing their coursework project work. It also analysed the learning component which facilitated or limited the integration of higher order thinking skill for students in accomplishing their projects. The results of both the questionnaire and the interview feedbacks indicated that students' development of higher order thinking skills remained within the information given instead of going beyond the information. Although the elements of transfer of knowledge (Krawthwohl et al., 2001) and finding solution to problems (Brandsfort and Stein, 1984) is present, the students still needed specialised skills to gather, evaluate and manage the resources well.

The data identified two main challenges that students experienced in understanding and integrating higher order thinking skills in relation to sourcing information to accomplish their project tasks. Firstly, students generally have a low level of knowledge on data management. While the samples are able to identify, scope, plan and present their task-based project work

in their language course, they still needed specialized knowledge of gathering, evaluating and managing their data in order to sensitize themselves in an "experiential learning" environment. As the task is related to language disorders related to brain deficit, the students needed specialized knowledge about brain in achieving a higher level of thinking in producing task-based output that are more engaging. The respondents noted that they were able to source for general psycholinguistic websites regarding brain-based language deficit; however they did not go further to explore medical websites, journals nor reading materials to obtain further information on their project work.

Secondly, none of the groups utilized learning software or specified technique to manage the data in accomplishing their project work. The respondents were able to find a lot of information regarding the case study that they were working on, but they were only able to manage in manually. The respondents acknowledged that they are aware of reference manager and other software such as EndNote but they never utilized any bibliographical software. They were only familiar with the APA citation style and preferred to utilise the manual format. Another challenge that the students identified in accomplishing their project tasks is managing resources for academic purpose resourcefully. The students had limitations in comprehending issues related to copyright, license and limits of fair use etc. Although the students were aware of *plagiarism* issue and *quoting the source* of their information, they particularly faced challenges in evaluating resource credibility and analyzing their source critically. In accessing information credibility, the library system was seen as a strong source of credibility. The students felt that any information gathered from the library is seen as a credible source. The word "journal" carried credibility and was considered as a reliable source of information. However, the students did not carry out background search on journal credibility or if they were among the blacklisted journal lists. This is the type of information that students need to be exposed to so that they will be able to think critically, evaluate, connect and synthesize the information they obtain. Two main implication arise from the above conclusion, First, it is important to note that the thinking process at a higher order should be interwoven, articulated and taught in the classroom. While task-based project is assigned to students, they need also to be informed of the aim of instilling higher order thinking capabilities in the completion of their project work. Although the task-based projects are given a specific time frame, the teachers need to monitor and facilitate the students so that they will directly or indirectly incorporate the higher order thinking skills in their work. The findings from this study, presents only a smaller part of a larger component of integrating higher order thinking skills in task-based language courses. Thus, it provides a generic interpretation from the selected samples. Nevertheless, it provides a platform for further investigations on the specific skills that helps to enhance the students' ability to facilitate a more meaningful task-based learning. In the context of this study, the limitations were the small samples group and they were not taught the methods of incorporating higher order thinking skills in accomplishing their task-based projects. A bigger sample and a detailed qualitative analysis would provide a more comprehensive analysis of the investigation.

Acknowledgment

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