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Intended Learning Outcomes: Who are they intended for?

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In Higher Education organisations within Singapore, Intended Learning Outcomes (ILO) are written from students' perspectives to help them gain clarity of what they should be able to do by the end of the course. Much of the rigour of the Outcomes-Based Teaching and Learning (OBTL) approach is contingent on developing observable and well-written ILO with the expectation that students will use them to guide their own learning. This paper explores the experience at the Nanyang Technological University, where the education strategy 2020 includes the OBTL initiative, which requires all courses to be re-designed based on constructive alignment. Our paper reports on one study of the impact of OBTL on student learning. Using a mixed methods approach in a quasi-experimental design, we collected data on student experience of course clarity pre and post OBTL, and their perception of the importance of ILO in their own learning. Our surveys (N=196) indicate that although students perceive a significantly higher level of clarity post-OBTL, they remain doubtful about the use of ILO to guide their own learning. In this paper, we present and discuss these findings to uncover reasons behind students' attitudes towards ILO.

Keywords: Outcomes-Based teaching and Learning, Impact Study, Curriculum Design, Intended Learning Outcomes (ILO)

Outcomes-Based Teaching and Learning (OBTL) is a curriculum design framework based on the principles of constructive alignment (Biggs and Tang, 2011). Much of its rigour begins with the quality and clarity of observable Intended Learning Outcomes (ILO) written from the students' perspectives, stating what they should be able to do by the end of the course. The purpose of ILO is both to guide faculty academic staff to design constructively aligned assessments and learning activities, and to provide students with a roadmap for their learning.

At Nanyang Technological University, our OBTL initiative requires all faculty to redesign their courses by 2020 using the principles of constructive alignment, and to communicate the following expectations with their students in the form of a course outline:

- a) ILO that communicate clearly to students in terms of what they should be able to do by the time they complete the course or programme of study.
- b) Teaching and learning activities that develop the behaviours defined in the ILO.
- c) Assessment tasks that elicit and assess the behaviours defined in the ILO.
- d) Clear grading criteria that enable both instructors and students to assess the extent to which the behaviours defined in the ILO are achieved.

We expect that faculty will design courses with greater clarity and focus, and that students will use the OBTL course outline as a roadmap to monitor their learning progress. The purpose of this study is to investigate if OBTL has indeed benefited both faculty staff and students as intended.

Literature review

Effective course design has been identified as a key strategy for making significant impact on the quality of higher education (Biggs & Tangs, 2011, Goodyear, 2015, Laurillard, 2013). The Outcomes-Based approach, also known as Backwards Design has challenged traditional methods of course design since the 1980's and have been widely adopted by K-12 and universities around the world (Biggs & Tang, 2011). The impact of course design on teaching predicates on the idea that quality teaching is more than quality delivery (Chickering & Gamson, 1987). In higher education, quality teaching begins by designing learning in a considered way to ensure that students of diverse backgrounds and motivations progress towards specific learning outcomes. In contrast, traditional methods of course design, such as those based on content coverage take the focus away from student learning, and more to content focused delivery.

Biggs and Tang (2011) argued that course design has significant impact on students' approaches to learning at university. They distinguished between deep and surface approaches to learning, where learners who are intrinsically interested in the subject and are therefore motivated in reaching deep understanding are seen as taking a 'deep' approach to their learning, whereas other learners who complete the minimum requirements are seen as taking a surface approach to learning. Biggs and Tang argue that if we design courses with outcomes of deep learning in mind, it is more likely that our students will learn more deeply.

Literature on OBTL has supported Biggs and Tang's assertion that there is a strong connection between a more constructively aligned course and students' approaches to learning as well as their course achievement. In a mixed-method study conducted by Wang, Su, Cheung, Wong and Kwong (2013) in Hong Kong, students who received OBTL treatment tended to adopt a deeper approach to learning. Results from another study in higher education also showed a positive and significant relationship between Outcomes-Based Education (OBE), a variant of OBTL, and student achievement (Dai, Wei, Wang & Wong, 2017).

Essentially, effective OBTL works in two ways to impact teaching and learning. First, it shapes the curriculum to focus on ILO, ensuring that what students do in class and during assessments are in fact aligned to the ILO. As a result, students would be more likely to move away from surface approaches to learning. Second, it acts as a roadmap to guide students in their progress towards the ILO. When students are clear about what they should be able to do by the end of a course, that is, ILO, they should be more likely to achieve the ILO. Hattie (2015) summarized findings from studies in education across the sector groups, and in this meta-analysis identified six key factors that had the most impact on improving student learning, one of which was when

teachers “explicitly inform the students about what success looks like near the start of a series of lessons” (p. 81).

Traditionally, within our university the course content is defined by course objectives, which are more geared towards content coverage than student learning outcomes. We expect that designing courses that begin with ILO will subtly shift the teachers’ attention towards students’ perspective of learning. This means it is possible that faculty staff would design their courses with greater clarity and better alignment. Therefore, our first aim is to establish if faculty design their courses differently and if their courses are clearer as a result.

Next, we explored whether ILO are simply an element, albeit an important starting point in the OBTL approach, that guide faculty in the rest of the course design or if they have direct use in guiding student learning as well. Although there is much evidence that students pay attention to assessment and assessment criteria (Andrade & Du, 2005; Higgins, Hartley, & Skelton, 2002; Sambell & McDowell, 1998), we have not found any studies in the literature on students’ use or perception of usefulness of ILO. Do students read the ILO and is that a factor in the way they approach to learning? The consideration here is whether our approach in emphasizing the clarity of ILO is necessary for OBTL to be effective in promoting quality teaching and deep learning at university.

Hence, our research questions are:

1. What is the impact of OBTL on faculty’s course design and teaching?
2. What is the impact of OBTL on student approaches to learning?
3. How do students and faculty perceive the usefulness of the ILO?

Method

In 2017 and 2018, we used a mixed methods approach including surveys and interviews to evaluate our OBTL initiative in a physics course. To address research question 1, we surveyed faculty using several qualitative open-ended questions related to course design and teaching. We later interviewed a Physics lecturer to further understand the OBTL process at this university from a faculty’s perspective, and survey his students using the Learning Experience Inventory of Courses (LEI-C) (Wong, Kwong, & Thadani, 2014) to see if students perceive courses with greater clarity in terms of learning outcomes and constructive alignment post-OBTL. This is an instrument that has been validated with students from Hong Kong Baptist University. Since 80% of our students are of the Chinese descent, we believe that this instrument is valid and useful for our purpose.

For research questions 2 and 3, we surveyed students from the same physics course using the Revised Study Process Questionnaire (R-SPQ) – a widely used validated instrument on student approaches to learning that involves Biggs himself (Biggs, Kember, & Leung, 2001), and several questions focusing on their use of the ILO. We further interviewed nine students from the 2018 cohort regarding their attitude towards the use of ILO to focus their learning.

Participants

All faculty members at the university received an email invitation to complete our survey anonymously. Of the 90 participants who responded, 72 had completed the OBTL process, of which 53 had made changes to their courses. There were 7 from Business, 27 from Humanities, Arts and Social Sciences, and 38 from the Sciences and Engineering. In particular, we

interviewed a Physics lecturer for a more in-depth investigation of the impact of OBTL on his class.

Student participants (N=196) of this study were from two sections of the Physics course, offered a year apart from each other, in 2017 and 2018. The 2017 cohort represents the pre-OBTL baseline data, whereas the 2018 cohort represents the post-OBTL treatment data. The 2017 cohort did not receive the ILO, whereas the 2018 cohort received the ILO. A total of nine students further invited to participate in focus group discussions and were able to come for the focus group discussion.

Results

In this section, we will present our results for the three research questions.

What is the impact of OBTL on faculty’s course design and teaching?

To find out the impact of OBTL on faculty’s approaches to course design and teaching, we asked a free-response question in the faculty survey, “What changes did you make to the course after going through the OBTL process?” This question was only given to those who had said they made changes (N=53). Table 1 shows the representation of faculty from various colleges at this university. We employed a qualitative analysis method using open-coding to classify the types of changes mentioned.

Table 1: Number of faculty who provided qualitative descriptions of changes they made to their courses

Colleges	Number of faculty
Humanities, Arts and Social Sciences	20
Engineering	11
Science	15
Business	6
Medicine	1

Our analysis of their reported changes suggests that OBTL has a positive impact on faculty’s approaches to course design and teaching. From their responses to the survey questions, there emerged seven categories of improvements that were made to their courses (see Table 2): *Increased focus on aims and learning outcomes* (Focus), *Increased clarity* (Clarity), *Improved alignment* (Alignment), *More student centred teaching approaches* (Teaching), *Improved assessment methods* (Assessment), *Increased transparency and clarity of assessment criteria* (Success Criteria), and *Improved teaching resources/content* (Content). Excerpts supporting each of these categories are given in Table 3.

Table 2: Types of changes faculty made to their courses as a result of OBTL

Faculty (N=53)	Focus	Clarity	Alignment	Teaching	Assessment	Success Criteria	Content
Percent	42%	27%	29%	33%	44%	8%	13%
Total # of mentions	22	14	15	17	23	4	7

Table 3: Excerpts supporting each category of changes

Type of Changes	Excerpts
Focus: Increased focus on aims and learning outcomes	“Prior to learning about OBTL, I already applied the concept of having students learn how to do things in class through applying techniques. OBTL gave me a better framework for this process. When I revise my courses or build new ones, I work from the perspective of first identifying the desired (and feasible) outcomes.”
Clarity: Increased clarity	“Clarity of all aspects of the syllabus.”
Alignment: Improved alignment	“Aligned the Course Outcomes that I envisaged with the Evaluation Strategy that I designed. It helped me better coordinate my expectations from the course. I have developed my assessments components to be more in line with the newly defined intended learning outcomes.”
Teaching: More student-centred teaching approaches	<p>“I have included more student activities during lectures. Based on the limited attention span. I have included small exercises and response tasks every 20-30 min.”</p> <p>“Designed a second-year team project that involved the use of IT tools and students working in a group so that they could experience the dynamics of team work and communication skills.”</p> <p>“My approach has become more oriented to the needs of my Students and to group and team works.”</p>
Assessment: Improved assessment methods	<p>“Questions and assignment are re-designed to meet the outcome.”</p> <p>“I have developed my assessments components to be more in line with the newly defined intended learning outcomes.”</p>
Success Criteria: Increased transparency and clarity of assessment criteria	<p>“Indicate the assessment criteria.”</p> <p>“The aims and objectives were refined with a higher focus on clarity applying a SMART criteria. My rubric was also changed completely to fall in line with what I consider to be a simpler and more efficient grading methodology as proposed in the OBTL training.”</p>
Content: Improved Teaching Resources/Content	“I have modified lecture content, the way tutorials are conducted as well as their assessment and have completely revised a second course.”

To further explore our findings, we surveyed a year 1 Physics course in 2017 and 2018. Our survey results (N=196) confirm that there is improved clarity post-OBTL (M=4.13, SD=.59) compared to pre-OBTL (M=3.92, SD=.63), $t(194)=-2.38$, $p<.05$ (Table 4). Students from the post-OBTL cohort were more likely to give a higher rating for *Clarity of What to Learn* as compared to students from the pre-OBTL cohort. However, there was no significant difference

in comparing *Clarity of How to Learn* and *Clarity of How Learning may be Assessed* pre- versus post-OBTL.

Table 4: Student Perception of Course Clarity for Year 1 Physics Course using the LEI-C

	2017 (Pre-OBTL)		2018 (Post-OBTL)		t-test
	Mean (N=91)	Standard Deviation	Mean (N=105)	Standard Deviation	
Clarity of what to learn	3.92	.63	4.13	.59	2.38*
Clarity of how to learn	4.08	.71	4.17	.60	0.97
Clarity of how learning may be assessed	3.83	.66	4.00	.68	1.78

*significant at $p < .05$

What is the impact of OBTL on students' approaches to learning?

The student survey from year 1 Physics course showed that there is a statistically significant difference in students' surface approach to learning. Students' surface approach to learning dropped significantly post-OBTL ($M=26.07$, $SD=7.91$) compared to pre-OBTL ($M=23.51$, $SD=5.86$), $t(104)$, $p < .01$ (Table 5). However, there is no significant difference in students' use of deep approach to learning between the pre-OBTL ($M=31.51$, $SD=7.57$) and post-OBTL cohorts ($M=30.16$, $SD=6.92$).

Table 5: Student Approaches to Learning

	2017 (Pre-OBTL)		2018 (Post-OBTL)		t-test
	Mean (N=91)	Standard Deviation	Mean (N=105)	Standard Deviation	
Deep approach to learning	31.51	7.57	30.16	6.92	-1.53
Surface approach to learning	26.07	7.91	23.51	5.86	-2.80**

**significant at $p < .01$

How do students and faculty perceive the usefulness of the ILO?

To answer this question, we interviewed students from a year 1 Physics course in two focus groups and the lecturer who taught this course.

Student perspectives on ILO

Nine participants from two separate focus groups responded to a semi-structured interview regarding their perceptions and attitudes towards OBTL. They also discussed how they might have used ILO to guide their learning. We present student responses on their use of ILO for learning in Table 6.

Table 6: Student excerpts from focus group discussions on use of ILO

Use of ILO	Excerpts from focus group discussions
<u>Reasons for using ILO</u>	
Improved understanding	“I read before the course starts. I will look at the learning outcomes to see whether I understand the concepts. For me, the learning outcomes are important.”
<u>Reasons for not using ILO</u>	
Reliance on instructor over self for direction	“What was clear was from the way he teaches, what he emphasizes. I wouldn’t spend the time reading the learning outcomes and constantly assessing if my lecturer is adhering to these things.”
Perception of ILO not useful	“Learning outcomes are not as important – the examples help - more elaborated.”
Lack of explicit connection to assessments and content	“May not help – it’s too brief. How is it linked to the questions? There is probably a link, but we cannot see the importance of the learning outcomes.”
Lack of content knowledge to understand ILO	“Learning outcome is a brief summary with unknown terms, which we don’t know. Something is missing. I cannot link up.”
Over-crowding of content	“The content is heavy from the start... you have so little time but you have so many things to cover.”

One student mentioned using learning outcomes to check for understanding and as a means to establish what to learn in the course. It is interesting to note that this student was previously from an institution that emphasized the use of learning outcomes. The other eight students did not use ILO, although some of them indicated they did not know what their course learning outcomes were. Other students skipped the learning outcomes and moved their attention directly to the course content. Based on these responses, we identified several reasons why students did not use ILO.

First, students relied on the teacher to provide direction and used past year examination questions to provide clarity on what to learn. Most of them mentioned that it would be a waste of their time to try and figure out the ILO and use them to guide their learning. They believe that since the lecturer will cover the relevant content, there is no need for them to question if the lecturers are on the right track. In other words, it is the lecturer’s responsibility to know what the learning outcomes are, and to lead them to achieve the learning outcomes, and not students’ responsibility to direct themselves to achieve the learning outcomes.

Second, students do not see the benefits of the ILO. They believed it was not important to understand the learning outcomes. Instead, their learning strategies revolved around making notes, and using examples to understand the topic. They said that if they studied the topic well enough, they would automatically achieve the learning outcomes.

Third, students do not see their connection to assessment and course content. They said they were unable to link the learning outcomes to exam questions or to each topic. They seem to require more context in order to fully interpret the learning outcomes. The learning outcomes in the course outline were presented as a list. There were no worked examples associated with any of them to provide the context that they needed to understand these learning outcomes.

Fourth, students do not have the content knowledge to decipher the ILO. They said that the learning outcomes contained unknown terms, which was hard to understand at the beginning of the course when they were first presented with the learning outcomes.

Lastly, there is evident over-crowding of content and too little time. They mentioned that content was heavy from the start. They had no time to pause to reflect on their learning. It was a waste of their time to continuously assess if their lecturer's teaching adheres to all the expectations given in the course outline.

Faculty perspectives on student use of ILO

Our interview with the lecturer (L1) confirmed student perceptions that ILO were not useful to students. A few perspectives emerged from our interview with the faculty.

First, OBTL is important in the process of course design, but it is not as critical for students to read the ILO within the course outline. Second, the exam-focused culture in our country has established a set way for students to use past year exams to guide their learning instead of ILO. Third, students do not understand the ILO until they have been contextualized in a problem or question. Fourth, there is too much content. In this course, students are required to master in 13 weeks x 3 hr/week content and concepts that would have otherwise taken about six months to teach and learn. Lastly, students may not have the necessary prior knowledge for this course. Because they come from different institutions, some that are more academically focused than others that are more industry and practically oriented, there is a gap in their prior knowledge.

Table 7: Faculty excerpts on use of ILO

Use of ILO	Excerpts from focus group discussions
<u>Reasons for not using ILO</u>	
Perception of ILO not useful	“I think it’s more for the instructors than the students. It’s a time for us to plan and structure the whole course. Whether the students will read it eventually, it’s not so critical. The important thing is that the instructor has gone through this thinking process.”
Lack of explicit connection to assessments and content	“In our culture, the OBTL will have to compete very hard with the past year exam questions – which not only implicitly include the intended learning outcomes but also illustrates it.”
Lack of content knowledge to understand ILO	“So they need to see [OBTL] enacted in exam questions... I think for them, that is the learning outcome.”
Over-crowding of content	“So this is actually a challenge for anyone and physics is ... changing the way you think so they have to do it very quickly and it’s a challenge.”

Discussion

In this study, we started with the perspective that effective OBTL should impact teaching and learning in two ways. First, the focus on clear ILO should help shape curriculum and teaching, which would impact students’ approaches to learning. Second, when students are clear about the ILO, it should act as roadmap to guide their learning. Consistent with the literature presented by Wang et al. (2013), we found that OBTL is positively correlated with students’ perception of course clarity and negatively correlated with students’ surface approach to learning. Faculty have also reported OBTL to be effective in improving the alignment and clarity of courses. However, except for one student who reported using ILO as a roadmap to guide his/her learning, most students do not perceive the ILO to be useful to guide their learning.

Qualitative analyses suggest that this could be a reflection of the overcrowding of content, which does not allow students to pause and reflect on their own learning, to formulate their own assessments of their learning, and consider how to move forward. In addition, students seem to have an unquestionable reliance on an external authority, and a resistance to direct their own learning. In reflecting on the potential benefits of OBTL on student learning, we suggest several considerations.

First, learning outcomes need to be more integrated into the curriculum. Our results show that students are unable to interpret and therefore use the learning outcomes because of their brevity and lack of context, as they are presented as a concise list of significant learning concepts. Even though learning outcomes are typically introduced at the beginning of the semester, it may be beneficial to reiterate them during each lesson and explicitly connect them to assessments when students are about to embark on the assessment tasks. At our university, we have started sharing

this with some of our faculty who are interested in improving their courses. We may be able to more systematically implement this on a wider scale after 2020, when the first wave of OBTL is complete.

Second, students need more support and scaffolding to use the learning outcomes for self-monitoring (Nicol & Macfarlane-Dick, 2006). Students do not have the knowledge at the beginning of the course to understand the learning outcomes because of the unknown terminology. Once students have been introduced to the terminology, it is useful for the instructor to teach them how they may use these learning outcomes to monitor their own progress. This means that instructors have to be adequately prepared to provide these supports to their students. For faculty development efforts, we will need to consider the level of expertise and willingness on the part of faculty to do what is perceived to be outside of their domain and responsibility.

Third, students need adequate time for reflection and deep learning to take place. Chickering & Gamson (1987) proposed “time on task” as one of the seven principles of best practice in undergraduate education. They described time on task as having enough time to reach the level of mastery. This phenomenon of lack of time for a learner to breathe and process their own learning is wide-spread among the Asian cultures with strong examination focus. This results in students barely having enough time to learn a topic before moving on to the next one. If we believe that self-directed learning is important, then we will need to give them time to reflect on their own learning and direct themselves to progress towards their goals. This type of self-directed learning behaviour requires time, which they currently do not have because of the overcrowding of content and over-focus on examinations. A more recent construct, “slow scholarship” (Harland, 2016) supports this idea. It advocates more thoughtfulness and deliberation in the learning and teaching process and less emphasis on the need to cover content efficiently. Our findings support Harland’s advice on the need to re-evaluate how we use our time so that we could have more meaningful activities.

Fourth, we need to re-examine university-wide curricula if we are to give students time to be more reflective and self-directed learners. Under the OBTL initiative, we may have been able to develop individual courses that are based on constructive alignment, but without re-examining university-wide curricula, OBTL may have a limited impact on student learning. This is in line with what Biggs proposed regarding aligning university level outcomes, programme level outcomes and course level outcomes. University-wide curricula will need to be carefully considered in a holistic manner to reduce overlap and improve the synergy of all the courses within a programme.

Finally, OBTL may require a cultural shift (Rogoff, 2016). We assume, perhaps inaccurately, that students desire and are capable of taking responsibility for their learning. However, in our culture, this may not be perceived as a value by students and instructors. It is still perceived as the lecturer’s responsibility to provide the right content and guidance to students to help them achieve the learning outcomes. Alternatively, we could redefine what OBTL means in our own context based on literature that purports a cultural difference in the way Western teachers and Asian teachers perceive of student-centred experiences (Mok 2006).

Limitations

We estimate that there were at least 200 faculty who had gone through the process but only 36.5% of them responded to the survey. At the same time, the student response for the survey

was low, representing only about 12.5% of each cohort. It is debatable if the respondents are representative of all faculty and students who have gone through OBTL. We could also have administered a pre-test within each cohort to ensure that their learning approaches across cohorts were comparable to begin with.

Significance

This paper offers insight into the extent to which OBTL affects the quality of student learning in the Singapore context. We have formed deeper insights into the role, or more specifically, limitations of ILO within the OBTL framework in our current culture.

In uncovering the reasons behind student and faculty's perception of OBTL and use of ILO, we brought to light several considerations and implications for maximising the benefits of OBTL. If we are to promote the form of self-regulated behaviour that is not only beneficial for student learning, but also their ability for lifelong learning, we may need to re-examine university-wide curricula and provide time and scaffolding to support students to be more reflective in their learning. Future studies will need to address this question and tackle the issue of OBTL in our culture.

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